



HITEC University, Taxila



**PROSPECTUS
2020-21**



Contents

| | |
|--|-----|
| Overview | 3 |
| Board of Governors | 4 |
| Message from the Chairman Board of Governors | 5 |
| Message from the Vice Chancellor | 6 |
| University Vision & Mission | 7 |
| Motto & Emblem | 8 |
| Taxila | 9 |
| How to reach HITEC University | 11 |
| Faculty of Engineering and Technology | 12 |
| Department of Electrical Engineering | 13 |
| Department of Mechanical Engineering | 41 |
| Department of Computer Engineering | 71 |
| Department of Civil Engineering | 86 |
| Department of Computer Science | 99 |
| Faculty of Basic Sciences | 131 |
| Department of Mathematics | 132 |
| Department of Physics | 151 |
| Department of Islamic Studies | 162 |
| Department of English | 176 |
| Department of Management Sciences | 181 |
| Quality Assurance and Collaborations | 203 |
| Admissions | 206 |
| Financial Matters | 211 |
| Academic Regulations | 216 |
| Students Affairs | 230 |
| IT Services | 236 |
| Library | 239 |



Founding Chairman, HIT Education Welfare Trust



Lt Gen Israr Ahmad Ghumman (Retd), HI, HI(M)

Overview

Heavy Industries Taxila Education City (HITEC) is an addition to the hallmarks of Taxila. Located at the foothills of Margalla, 30 km North West of Islamabad and Rawalpindi, it is an integrated and purpose specific complex, housing educational institutes, catering for pre-school to university level education.

HITEC University was granted its own charter in November, 2009 by the Government of the Punjab. The University is sponsored by Heavy Industries Taxila Education Welfare Trust (HITEWT).

The University has a dynamic, industrious and highly committed full time faculty which keeps abreast with the latest developments in teaching methodologies. In a short span of time, HITEC University has emerged as a modern and vibrant place of learning and can be rightly called a citadel of knowledge. It hosts state-of-the-art facilities and takes pride in offering learning environment having unmatched safety and security of the premises.

The University has spacious, air-conditioned and very well

equipped classrooms, laboratories, library, auditorium and excellent allied facilities. A newly constructed hostel is available on first come first serve basis to accommodate over 300 students within the campus. Library provides ample space for books, reading and research activities.

Students get abundant opportunities for internships and employment due to close proximity of the University to Heavy Industries Taxila (HIT), Pakistan Ordnance Factories (POFs), Heavy Mechanical Complex (HMC), Pakistan Aeronautical Complex (PAC) Kamra, Telephone Industries of Pakistan (TIP) and FECTO Cement etc.

The University, besides imparting quality education, assigns equal importance to character building, extra and co-curricular activities. We aim to make our students morally and physically sound individuals and responsible citizens of Pakistan, with a strong urge of service to humanity.



Board of Governors

- | | | |
|-----|---|-----------------------|
| 1. | Major General Syed Aamer Raza, HI (M) Chairman Heavy Industries Taxila Education Welfare Trust | Member & Chairman |
| 2. | Lieutenant General Israr Ahmad Ghumman (Retd), HI, HI (M) Former Chairman HIT Education Welfare Trust | Member |
| 3. | Dr Nabeel Hayat Malik Chairman NESCOM, Islamabad. | Member |
| 4. | Mr. Jawad Salim Qureshi Chairman, Pakistan Engineering Council, Islamabad | Member |
| 5. | Dr Tariq Banuri Chairman Higher Education Commission, Islamabad | Member |
| 6. | Prof. Dr. Fazal Ahmad Khalid Chairman, Punjab Higher Education Commission, Lahore | Member |
| 7. | Prof. Dr. Niaz Ahmed Akhtar, SI Vice Chancellor, University of the Punjab, Lahore. | Member |
| 8. | Prof. Dr. Muhammad Younus Javed Vice Chancellor, HITEC University Taxila | Member & Secretary |
| 9. | Mr. Wahaj Us Siraj CEO, Nayatel Pvt Ltd, Islamabad | Member |
| 10. | Brigadier Zia Abid Bajwa Director Technical, Heavy Industries Taxila | Member |
| 11. | Brigadier Muhammad Ali Watoo Managing Director, HRF(M), Heavy Industries Taxila | Member |
| 12. | Brigadier Imran Haider Sherazi Director Administration, Heavy Industries Taxila | Member |
| 13. | Colonel Ajmal Rafique Managing Director, APCF, Heavy Industries Taxila | Member |
| 14. | Mr. Ammar Saddique Khan Member Provincial Assembly of the Punjab | Member |
| 15. | Mr. Jahangir Khanzada Member Provincial Assembly of the Punjab | Member |
| 16. | Mrs. Sabrina Javaid Member Provincial Assembly of the Punjab | Member |
| 17. | Secretary to the Government Higher Education Department, Punjab | Member |

Message from Chairman Board of Governors

It gives me immense pleasure that the HITEC University has achieved the status of a highly reputed seat of learning and research among its contemporary institutions within one decade in line with the aspirations of the founding fathers. It has steadily grown and progressed horizontally and vertically by starting new degree programs keeping in view the national and international job market. The university has been a leader in adopting the new trends in education and setting quality standards by following the educational parameters given by Higher Education Commission Islamabad and Pakistan Engineering Council. I am very delighted to express that HITEC University was among the pioneer Higher Education Institutions that switched over to Outcome Based Education system under the umbrella of Washington Accord, thus earning the recognition and acceptance of its engineering degrees worldwide.

Universities play a crucial role in generating new ideas, and in accumulating and transmitting knowledge. Higher education institutions are major sources for providing the human capital required for industry in particular and society in general. They are indispensable players in enhancing the socio-economic environments and the quality of life through applied research. I am pleased to learn that the research output of the university has remained commendable. The faculty and the students are actively involved in research activities in collaboration with industrial sector, especially the R&D projects undertaken from Heavy Industries Taxila.

In the modern technological advancement era, no institution can work in isolation and needs to join the other players to find the new avenues and solutions to the problems of the academia and industry. HITEC University as a pioneer member is providing the platform of Asia Technological University Network (ATU-Net) to its faculty and students to take full benefit of the research facilities and learning opportunities available in the member countries. The HITEC University's international collaborations with top ranking universities of UK, Turkey and Malaysia also provide ample opportunities to its students to broaden their



learning experiences by completing part of their education in these universities at low cost.

The Board of Governors and the management of the university remain fully committed to provide quality education to the students and their moral grooming to make them proud and responsible citizens of Pakistan.

May Allah SWT grant success to HITEC University in all its endeavors. Ameen

Major General
Syed Aamer Raza, HI(M)

Message from the Vice Chancellor

Welcome to the prestigious HITEC University which is characterized by its excellent teaching-learning environment and diversity in its programs to prepare the students in response to recent technological advancements and global challenges. Our major objective is to create a platform for free and open exchange of a wide range of ideas in a culture of mutual respect, where our shining students can meaningfully contribute to provide innovative solutions to the public and private organizations within the country and abroad. Our competent faculty strives to impart the most advanced analytical and specialized skills in our students to contribute for the betterment of our nation. We believe that innovation requires an optimized blend of engineering, mathematics, social sciences and business applications to be compiled together in an interdisciplinary fashion.

Advanced labs, innovative & interactive teaching methodologies, foreign qualified & experienced faculty, conducive research opportunities, and academia-industry linkages have all been merged to place HITEC University among top emerging universities of Pakistan. HITEC University is distinguished for its progressive curriculum design that mainly focusses on problem-solving capabilities, industrial-specific objectives, creative design abilities, and interdisciplinary research methodologies. Our students really enjoy an interactive learning experience that goes beyond merely learning tools or knowledge, but development of critical thinking and provision of solutions to complex problems. HITEC University's academic prospects are balanced with campus lifestyle which provides numerous extracurricular activities such as sports, literary, debating, cultural, adventurous and social events.

With an outstanding legacy of 13 years, our University has already out classed its competitors in electrical, mechanical, computer and civil engineering as well as in computer science, mathematics and Islamic studies programs. All our undergraduate engineering programs are accredited by Pakistan Engineering Council (PEC) based on Outcome Based Education (OBE) system under Washington Accord (WA). Our engineers with OBE degrees are at par with the engineers of WA signatories and are, therefore, being employed in USA, Australia, Canada, New Zealand, Ireland, South Korea, China, Japan, UK and Malaysia. Our BS Computer Science program is also accredited with the highest category 'W' by National Computing Education Accreditation Council (NCEAC).

On top of its excellent undergraduate programs, HITEC University also offers admissions in MS and PhD programs in cutting-edge research areas in electrical, mechanical, computer engineering, computer science, mathematics, and islamic studies. Our highly-qualified PhD supervisors are approved by HEC and have attained



international exposure in academia and industry. These supervisors enjoy international recognition due to their research contributions in the highly reputed journals and conferences. HITEC University is also eligible for financial support through public funding for its faculty development, research pursuits, foreign faculty hiring and infrastructure development. Office of Research, Innovation, and Commercialization (ORIC) focuses on providing conducive environment to our research students through its collaborative arrangements with the industry, funding/sponsoring partners and national R&D institutions.

For the benefit of our students, HITEC University also offers students exchange programs with different reputed international universities at mutually agreed terms and conditions. In addition, our university is a pioneer member of Asia Technological University Network (ATU-NET), an international alliance of more than 20 universities from 10 Asian countries and our students can choose to study for one semester in a university of their choice without paying any tuition fee.

If you wish to become a successful professional or entrepreneur, then join us. I would like to welcome you at HITEC University to study the most demanding and challenging discipline of your choice.

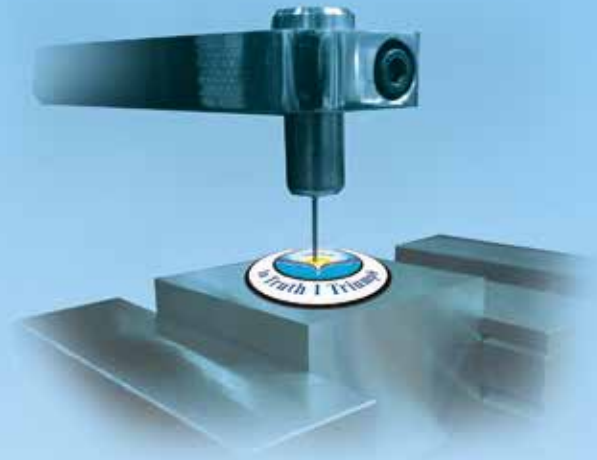
Prof Dr Muhammad Younus Javed, SI (M)

VISION

HITEC University shall be a premier institution and bastion of academic excellence. It must become a citadel of our ideological moorings, national integration and socio-religious values. HITEC ought to trigger the human mind to think clearly perceiving the environment and issues confronting human beings, seeking intelligent, viable and practical solutions, leading to societal development and the overall betterment of human race. The campus shall provide our progeny the environment for intellectual flourishing, nurturing fertility of thought and creativity. HITEC University faculty will focus on preparing our youth to face the challenges of life with honor, confidence and fortitude through character building and grooming. In HITEC University merit, justice, honesty and adherence to moral and social values must prevail. The University shall provide a pedestal for fulfillment of our youth's aspirations and hopes to live an honorable life as citizens of Pakistan.

MISSION

HITEC University will be a center of excellence in teaching, learning and research. We instill and inspire intellectual curiosity, lifelong quest for knowledge and a keen urge for social and moral responsibility. The University will establish strong linkages with industry, ensuring innovative research leading to economic prosperity of Pakistan.



MOTTO

The motto should guide the students in their future lives as a beacon of light and be a reflection of their character strength and grooming. 'Truth' is the key word in the selection of University's motto, for indeed it has been the virtue of the prophets and the object of pursuit of all great men, scholars, researchers and scientists. Finding and upholding truth is the purpose and spirit of real education. The most befitting inspiration was found in a Quranic verse, "Wa Qaulu Qaulun Saddeeda", (Ayat 70, Al-Ahzab) but to keep the sanctity of the divine words it has been replaced by a Hadith, carrying the same assertion "Assidqo Yunjee", meaning "In truth lies success". Its English equivalent "In Truth I Triumph" is the translation of a Latin slogan "In Veritate Triumpho" ascribed to Myddelton of Gwanynog (1638 AD).

EMBLEM

HITEC University emblem symbolizes Pakistan's national heritage, ideology, cultural values, and provides conviction and courage to its students. The University emblem is a roundel, in line with traditional Muslim shield. It has two rings; the outer ring contains the name of institution and its motto while the inner ring embodies a multi-layered insignia. On the top is the rising Sun signifying energy, hope and newness. At the bottom is a body of water which is source of all life. In the middle the white emerging lines stand for the earth which is the abode of all mankind. The blue lines show rivers on the Earth indicating that civilizations have grown on the bank of rivers. The pattern formed by white and blue lines alludes to an open book that represents all recorded human knowledge. The book is placed on the surface of the water, pointing to an eternal challenge we are confronted with. In the back drop of the book, emerges the golden Sun sending its rays across the universe. The rising Sun also represents the dawn of a new era where darkness is dispelled and brightness is ushered in.



Taxila

Taxila or Takshashila (city of cut stone) is a historical city, which is just 30 kms north of Islamabad, the capital of Pakistan. It is one of the most important archaeological sites in the country and was included as UNESCO World Heritage List in 1980.

Taxila, the main centre of Gandhara civilization, has been an important Vedic/Hindu and Buddhist center of learning from the 6th century BC to the 5th century CE. During its peak period of glory, Taxila exerted “intellectual suzerainty” over other centres of learning in India, and its primary concern continued to be the higher education in various arts and crafts. This is the region from where Buddhism travelled to the Far East. Persians, Greeks under Alexander the Great and Central Asians invaded this the area and all subsequently left their mark.

Taxila is perhaps best known because of its association with Chanakya, also known as Kautilya, the strategist who guided Chandragupta Maurya and assisted in the founding of the Mauryan empire. The Arthashastra (Sanskrit for The knowledge of Economics) of Chanakya, is said to have been composed in Taxila. The Ayurvedic healer Charaka also studied here. The ancient grammarian Panini, who codified the rules that would define classical Sanskrit, has also been part of the community at Taxila.

In early 20th century, the British archaeologist Sir John Marshall conducted extensive excavations of Taxila. There are over 50 archaeological sites scattered in a radius of 30 kms around the city. Some of the most important sites are; Dhamarajika Stupa and Monastery (300 BC – 200 AD), Bhir Mound (600-200 BC), Sirkap (200 BC – 600 AD), Jandial Temple (c.250 BC) and Jaulian Monastery (200 – 600 AD).





Nicholson's Obelisk, a monument of British colonial era situated at the Grand Trunk road welcomes the travelers coming from Rawalpindi/ Islamabad to Taxila. The monument was built by the British to pay tribute to Brigadier John Nicholson (1822–1857) an officer of the British Army who died in India in 1857.

In addition to the ruins of Gandhara civilization and ancient Buddhist/Hindu culture, relics of Mughal gardens and vestiges of historical Grand Trunk Road, which was built by Emperor Sher Shah Suri in 16th century, also exist in Taxila region.

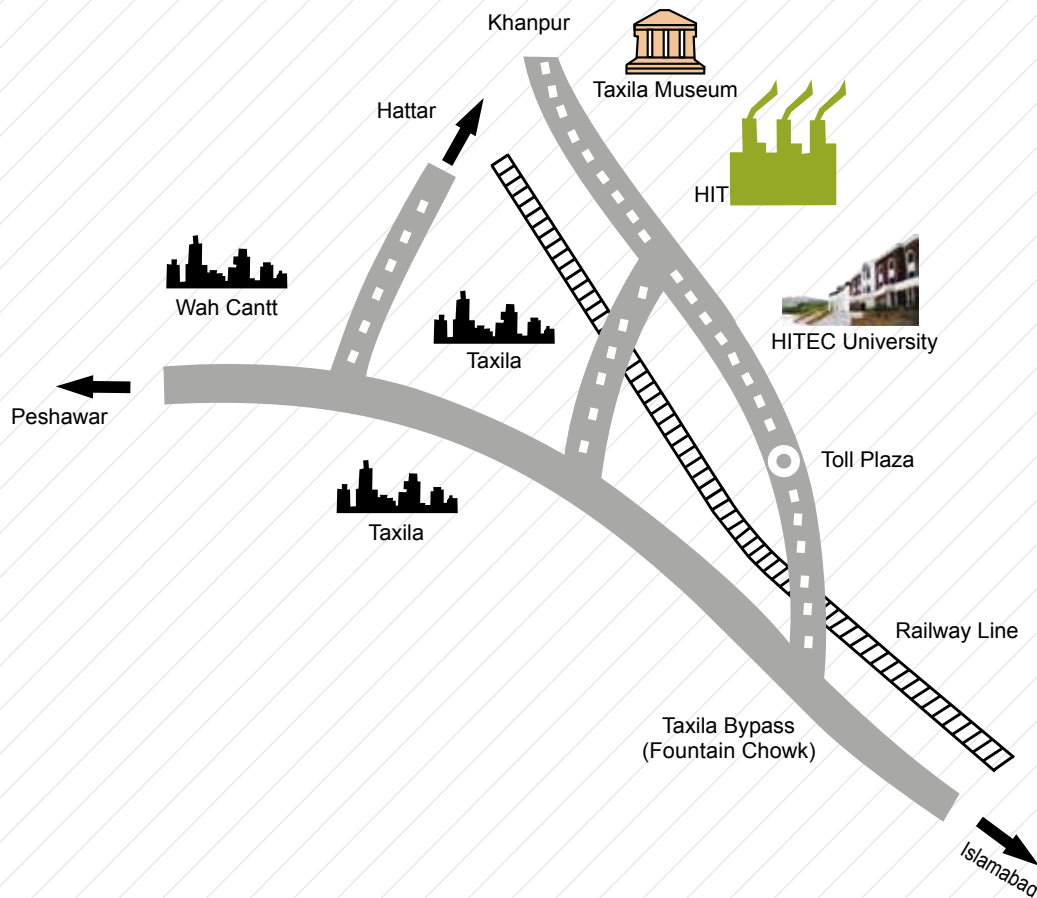
Modern Taxila is heavily industrialized. Industries like HIT, PMO, HMC, HEC and POFs etc are located in this region.



How to Reach HITEC University ?

From Islamabad/Rawalpindi proceed on the GT road towards Peshawar. Only 10 km ahead of Sangjani Toll Plaza is the Taxila bypass. Those travelling on the motorway may use Tarnol or Jhang Bahter interchange to come on the GT road in order to reach the Taxila bypass. Turn towards the Taxila Museum, about 2 km on the Museum Road is HITEC University – a complex of huge buildings in red bricks and a prominent white mosque, all enclosed in black-stone boundary wall.

Location Map



Faculty of Engineering and Technology



Prof. Dr. S. Kamran Afaq
Dean

It is my pleasure to welcome you to the HITEC University. Faculty of Engineering and Technology of HITEC University is composed of five departments, namely, Department of Electrical Engineering, Department of Mechanical Engineering, Department of Computer Engineering, Department of Civil Engineering and Department of Computer Science. Our undergraduate programs of Electrical, Mechanical and Computer Engineering are fully accredited by the Pakistan Engineering Council, as per Outcome Based Education (OBE) system. It is a unique honor which implies that our Degrees in these disciplines are unconditionally recognized by advanced countries for employment under Washington Accord. Our BS Computer Science Program is also accredited and is placed in “W” category (the highest) by the National Computing Education Accreditation Council (NCEAC). Our educational programs are a holistic healthy blend of social sciences, engineering, and business practices and, above all, ethical values. Our spacious and extremely well-equipped Laboratories are enviously viewed by many of our competitors.

It is pleasure to announce that this year we are planning to launch Biomedical Engineering and Software engineering programs under Electrical Engineering and Computer Science departments respectively.

Besides nurturing future leaders of society, HITEC University is also dedicated to world-class research; we also offer MS/PhD level education in Electrical, Mechanical and Computer Engineering as well as in Computer Science. We are strictly adhering to the guidelines of Higher Education Commission (HEC) of Pakistan for imparting quality education/research to

Vision

Endure to propagate knowledge and perpetuate truth for prosperity.

Mission

The mission is to produce professionals well-versed in the knowledge of their respective domain and its application in the service of industry and community for creating innovative solutions keeping in view the ethical, environmental and societal concerns.

our students.

Highly qualified, professionally competent, research oriented and experienced faculty members have been employed to ensure effective teaching and meaningful R&D as per set standards and objectives of PEC, NCEAC and HEC. Besides keeping abreast with the latest developments in the knowledge of their respective domains, the faculty members actively participate in the R&D activities. It stimulates new ideas and innovative thinking to guide our students in their research and implementation work.

The university offers a wide spectrum of co-curricular and extracurricular activities for our students to groom into balanced personalities. We also involve our students to actively participate in “Social Service” related activities, so as to make them conscious of social responsibilities towards the society. In brief, the HITEC University is endowed with all those assets, resources and facilities which are the hallmarks of a top class Institution in Pakistan. So, if you aspire to be a competent Electrical, Mechanical, Civil, Computer Engineer or a skilled Computer Scientist, we are here to groom and equip you with requisite knowledge, skills and the attitude for your acceptance in the national and international job market.

Department of Electrical Engineering



Dr. Ashiq Hussain
Chairman

Since its inception, the Department of Electrical Engineering has been amplifying HITEC's claim of playing a pivotal role in imparting quality education at both undergraduate and postgraduate levels, promoting result-oriented research, and training students to utilize their potentials; thereby, catering to the ever-increasing demand of the qualified, trained, and skilled workforce, at home and abroad, by producing highly-motivated and professionally-competent engineers with an extensive caliber of personal, social, cognitive, and project management skills.

Our study programs, in conjunction with a highly conducive environment, carefully-planned core and elective courses, lab work, curricular and co-curricular activities, mentored research support, regularly held seminars and conferences, internships, professional trainings, counseling, and community service, aim at educating personally, professionally, and ethically dependable and inventive engineers who are not only well-equipped theoretically but also have hands-on experience of using modern engineering tools.

The curricula and syllabi of BS, MS, and PhD programs are well-planned and designed according to recommendations

and guidelines of Higher Education Commission (HEC) and Pakistan Engineering Council (PEC). The BS Electrical Engineering program is duly accredited by Pakistan Engineering Council under OBE system and newly planned BS Biomedical Engineering program has been applied for approval. An important feature of this BS Biomedical program is the presence of HITEC Institute of Medical Sciences and HIT Hospital in very close vicinity to HITEC University. These allied facilities will be extremely beneficial to impart professional training comprising of teaching and laboratory sessions to our students by medical specialists and highly skilled technical staff. Our graduates are readily accepted in the local as well as international job market where they are valued for their specialized knowledge, ability to communicate and solve problems, and for having a strong entrepreneurial spirit.

The teaching staff of the Department for Electrical Engineering and Biomedical Engineering is highly qualified, erudite, motivated, and dedicated, with outstanding professional experience and abilities to take education and learning into uncharted waters. Our exceptional and committed faculty members not only excel in their areas of specialization but also keep themselves abreast of the advancements in teaching methodologies. These distinguished faculty members align with our values of scholarship, research, and service by radically changing existing processes and re-engineering new ones, periodically updating curriculum and course contents to meet the ever-changing requirements of the volatile industrial trends, mapping curricular and extra-curricular activities into a meaningful and unwavering educational experience, creating opportunities for the students to exhibit their abilities and talents, and publishing good quality research work in journals with high impact factor.

I would like to avail this opportunity to welcome you to join our undergraduate and postgraduate programs; and I assure you, on behalf of all faculty members, that we will help you to pursue your dreams in a diverse social, cultural, and educational environment.

Faculty

Dr. Tahir Nadeem Malik (HEC Approved Supervisor)

Designation: Professor/Dean QA&C
Qualification: PhD Electrical Engineering, UET, Taxila
Areas of Interest: Power System Analysis, Optimization Techniques in Power Systems
Contact: tahir.nadeem@hitecuni.edu.pk

Dr. Hafiz Ashiq Hussain (HEC Approved Supervisor)

Designation: Associate Professor/Chairperson EED
Qualification: PhD (Physical Electronics), Telecom Engineering, BUPT, China
Areas of Interest: Optical Fiber Communication and Silicon Photonics
Contact: ashiq.hussain@hitecuni.edu.pk

Dr. Fawad Ahmad (HEC Approved Supervisor)

Designation: Associate Professor
Qualification: PhD, NTU, Singapore
Areas of Interest: Image Processing, Multimedia Security, and Cryptography
Contact: fawad@hitecuni.edu.pk

Dr. Raza Ali Shah (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Information and Communication Technologies), AIT, Thailand
Area of Interest: Wireless Communication
Contact: raza.ali.shah@hitecuni.edu.pk

Dr. Syed Kashif Imdad (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Electrical Engineering), UPC Barcelona, Spain
Areas of Interest: Power Systems, Electrical Drives, Power Distribution, and High Voltage Engineering
Contact: engr.kashif@hitecuni.edu.pk

Dr. Muhammad Ali Mughal (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD, Beihang University, Beijing, China
Areas of Interest: Electric Power System, Renewable Energy, Parameter Estimation, and Optimization
Contact: ali.mughal@hitecuni.edu.pk

Dr. Nizamuddin

Designation: Assistant Professor
Qualification: PhD, King Saud University, Riyadh, Saudi Arabia
Areas of Interest: Biomedical Engineering, Communication
Contact: nizam.uddin@hitecuni.edu.pk

Engr. Muhammad Farrukh Aftab

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Area of Interest: Computer Networks
Contact: farrukh.aftab@hitecuni.edu.pk

Engr. Muhammad Talha Asghar

Designation: Assistant Professor
Qualification: MS (Electronics Engineering), COMSATS, Islamabad
Areas of Interest: Communications Systems, Computer Networks, WiMAX, and Network Security
Contact: talha.asghar@hitecuni.edu.pk

Engr. Zeeshan Ahmad

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Control Systems and Embedded Systems
Contact: zeeshan.ahmed@hitecuni.edu.pk

Engr. Zeeshan Habib

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Wireless Communication and Signal Processing
Contact: zeeshan.habib@hitecuni.edu.pk

Engr. Menna Nawaz

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Area of Interest: Control Systems
Contact: minna.nawaz@hitecuni.edu.pk

Engr. Adeel Ahmad

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Area of Interest: Control Systems
Contact: adeel.ahmad@hitecuni.edu.pk

Engr. Iftikhar Ahmed

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), COMSATS, Islamabad. PhD (In Progress)
Areas of Interest: Electromagnetic Field Theory, Antennas, and Microwave and Radio Frequency
Contact: iftikhar.ahmed@hitecuni.edu.pk

Engr. Waqas Ahmed

Designation: Assistant Professor
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Signal Processing and Communication
Contact: waqas.ahmed@hitecuni.edu.pk

Engr. Muhammad Shahbaz Khan

Designation: Lecturer
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Bio-MEMS/NEMS and Nanotechnology
Contact: shahbaz.khan@hitecuni.edu.pk

Engr. Muhammad Shahzad

Designation: Lecturer
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: VLSI, Embedded System, Power Protection, and Electrical Machines
Contact: muhammad.shahzad@hitecuni.edu.pk

Engr. Mamoon Riaz

Designation: Lecturer
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Signal Processing, Automation and Control, and Electrical Power
Contact: mamoon.riaz@hitecuni.edu.pk

Engr. Kamran Mehmood

Designation: Lecturer
Qualification: MS (Electrical Engineering), UET, Taxila
Areas of Interest: Electrical Power Systems, Power System Operation and Control and High Voltage Engineering
Contact: kamran.mehmood@hitecuni.edu.pk

Engr. Zain Zia

Designation: Lecturer
Qualification: MS (Electrical Engineering), AIT, Thailand. PhD (In Progress)
Areas of Interest: Electric Power System and Power Sector Management under Deregulation
Contact: zain.zia@hitecuni.edu.pk

Engr. Muhammad Ahtasham Abid

Designation: Lecturer
Qualification: MS (Electrical Power Engineering), COMSATS, Abbottabad
Area of Interest: Power Systems
Contact: ahtasham.abid@hitecuni.edu.pk

Engr. SafeeUllah

Designation: Lecturer
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Linear Control Systems, System Design, and Embedded Systems
Contact: safee.ullah@hitecuni.edu.pk

Engr. Iram Mushtaq

Designation: Lecturer
Qualification: MS (Engineering Management), UET, Taxila. PhD (In Progress)
Areas of Interest: Knowledge Management, Technology Management, and Cyber-Physical Systems
Contact: iram.mushtaq@hitecuni.edu.pk

Engr. Waqas Ali

Designation: Lecturer
Qualification: MS (Electrical Engineering), HITEC University, Taxila. PhD (In Progress)
Areas of Interest: Power Systems and Electromagnetics
Contact: waqas.ali@hitecuni.edu.pk

Engr. M. Kashif Sattar

Designation: Lecturer
Qualification: MS (Electrical Engineering), UET, Taxila
Areas of Interest: Power Systems and Optimization Techniques
Contact: kashif.sattar@hitecuni.edu.pk

Engr. Maryam Munir

Designation: Lecturer
Qualification: MS (Electrical & Computer Engineering), SCUT, China
Areas of Interest: Embedded Systems, Control System
Contact: maryam.munir@hitecuni.edu.pk

Engr. M. Adeel Ahmed Siddiqui

Designation: Lecturer
Qualification: MS (Biomedical Engineering), Sir Syed University of Engineering & Technology, Karachi
Areas of Interest: Biomedical Engineering, Bio-instrumentation, Modeling and Simulation
Contact: adeel.ahmed@hitecuni.edu.pk

Engr. Ayesha Naeem

Designation: Lecturer
Qualification: MS (Biomedical Engineering), Riphah International University, Islamabad
Areas of Interest: Biomedical Engineering, Bio-instrumentation
Contact: ayesha.naeem@hitecuni.edu.pk

Ms. Rabia Ramzan

Designation: Jr. Lecturer
Qualification: MPhil (English Literature-In Progress)
Areas of Interest: English Literature, Linguistics, and ELT
Contact: rabia.ramzan@hitecuni.edu.pk

Ms. Sehrish Naqvi

Designation: Jr. Lecturer
Qualification: MS English (In Progress), TEFL, MA, BEd
Areas of Interest: Literature and ELT
Contact: sehrish.naqvi@hitecuni.edu.pk

Ahmed Hassan Raza

Designation: Lab Engineer
Qualification: BS (Electrical Power Engineering), UET Taxila
Area of Interest: Power Integration Issues
Contact: ahmed.hassan@hitecuni.edu.pk

Engr. Syed Sarosh Ali Shah

Designation: Lab Engineer
Qualification: BS (Biomedical Engineering), Mehran University of Engineering and Technology, Jamshoro
Areas of Interest: Biomedical & Instrumentation
Contact: sarosh.ali@hitecuni.edu.pk

Engr. Rohmma Latif

Designation: Lab Engineer
Qualification: BS (Biomedical Engineering), Riphah International University, Islamabad
Areas of Interest: Biomedical Instrumentation, Medical Image Processing
Contact: rohmma.latif@hitecuni.edu.pk

BS Electrical Engineering

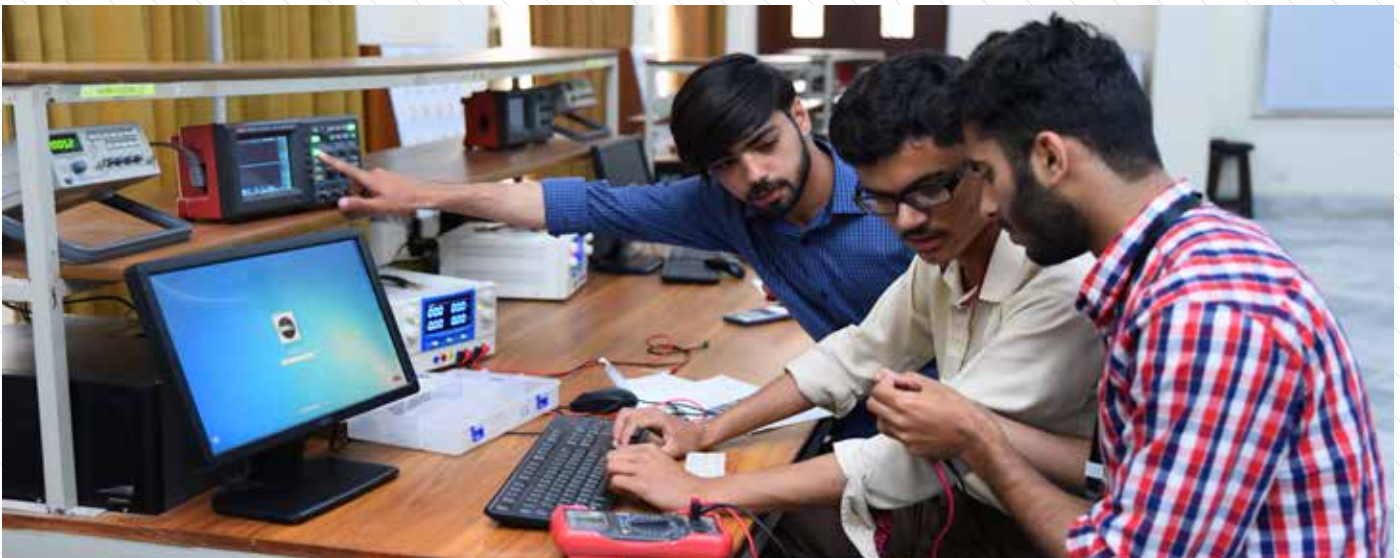
BS Electrical Engineering is a broad-based bachelor degree program which is duly accredited by PEC at level-II, Washington Accord, and includes the study of subjects like Digital and Analog Electronics, Electromagnetic Fields, Control Systems, Communication Systems, Power Engineering, etc. The curriculum is in line with the requirements of Pakistan Engineering Council (PEC) and is comprehensive enough to meet all challenges and requirements of the field of Electrical Engineering at national and international levels. The program provides the students with the skills required for a broad range of jobs in industry, government, academia, business, and R&D organizations.

In an attempt to better serve our undergraduate students and to shorten the time between their discovering a problem and getting advice concerning its solution, the Department has set up an open advising system that provides counseling and support to the students in getting through academic and administrative issues and establishing a smooth working relationship within the Department. Each faculty member is assigned the duty

of a class advisor and the students are encouraged to interact with him/her as well as with the entire faculty, so that, after the completion of BS program, they have better understanding of their field of choice.

The courses in the first four semesters of the program are same for all students; however, from the fifth semester and after, elective courses are offered to make provision for the two major streams, that is, Electronics and Telecom Engineering and Power Engineering. The courses are so designed that they establish strong academic foundation and ascertain the candidates' knowledge and skills for specialized and career-oriented opportunities.

After the completion of the program, the degree of BS Electrical Engineering is conferred upon the students; with the transcript clearly reflecting the sequence of subjects as per adopted stream. The program spans over four years (eight semesters) and comprises 136 credit hours.



Curriculum

Semester-1

| Course Code | Course Title | Credit hours |
|---------------------------|--------------------------------|--------------|
| EE-101 | Engineering Workshop | 0+1 |
| EE-102 | Electric Circuit Analysis | 3+0 |
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| EC-110 | Computing Fundamentals | 2+1 |
| HS-101 | English | 3+0 |
| BS-104 | Engineering Physics | 3+0 |
| EE-102L | Electric Circuit Analysis Lab | 0+1 |
| BS-104L | Engineering Physics Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-2

| Course Code | Course Title | Credit hours |
|---------------------------|-------------------------------------|--------------|
| EE-103 | Network Analysis | 3+0 |
| MT-303 | Applied Linear Algebra | 2+0 |
| ME-210 | Engineering Mechanics | 3+0 |
| ME-211 | Computer-Aided Engineering Drawing | 0+1 |
| EC-112 | Object Oriented Programming | 2+1 |
| EE-205 | Electronic Devices and Circuits | 3+0 |
| EE-103L | Network Analysis Lab | 0+1 |
| EE-205L | Electronic Devices and Circuits Lab | 0+1 |
| Total Credit Hours | | 17 |

Semester-3

| Course Code | Course Title | Credit hours |
|---------------------------|--------------------------------|--------------|
| EE-302 | Signals and Systems | 3+0 |
| EE-203 | Digital Logic Design | 3+0 |
| MT-201 | Complex Variables & Transforms | 3+0 |
| IS-211 | Islamic Studies | 2+0 |
| EC-222 | Data Structure & Algorithms | 2+1 |
| HS-103 | Communication Skills | 3+0 |
| EE-203L | Digital Logic Design Lab | 0+1 |
| HS-203 | Community Service | 0+1 (NC) |
| Total Credit Hours | | 18 |

Semester-4

| Course Code | Course Title | Credit hours |
|---------------------------|---|--------------|
| EE-204 | Electrical Machines-I | 3+0 |
| EE-303 | Microprocessor and Interfacing Techniques | 3+0 |
| MT-103 | Differential Equations | 3+0 |
| EE-304 | Communication Systems | 3+0 |
| HS-201 | Technical Report Writing | 3+0 |
| EE-204L | Electrical Machines-I Lab | 0+1 |
| EE-303L | Microprocessor and Interfacing Techniques Lab | 0+1 |
| EE-304L | Communication Systems Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-5

| Course Code | Course Title | Credit hours |
|---------------------------|-----------------------------------|--------------|
| EE-305 | Linear Control Systems | 3+0 |
| EE-301 | Electromagnetic Theory | 3+0 |
| MT-302 | Probability and Statistics | 3+0 |
| EE-307 | Instrumentation & Measurement | 3+0 |
| EE-3XX | Depth Elective-I | 3+0 |
| EE-305L | Linear Control Systems Lab | 0+1 |
| EE-307L | Instrumentation & Measurement Lab | 0+1 |
| EE-3XXL | Depth Elective-I Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-6

| Course Code | Course Title | Credit hours |
|---------------------------|-------------------------------|--------------|
| MT-202 | Numerical Methods | 2+1 |
| EE-308 | Electronic Systems Design | 3+0 |
| EE-405 | Power Electronics | 3+0 |
| EE-3XX | Depth Elective-II | 3+0 |
| EE-308L | Electronic Systems Design Lab | 0+1 |
| EE-405L | Power Electronics Lab | 0+1 |
| EE-3XXL | Depth Elective-II Lab | 0+1 |
| HS-102 | Pakistan Studies | 2+0 |
| Total Credit Hours | | 17 |

Semester-7

| Course Code | Course Title | Credit hours |
|---------------------------|----------------------------|--------------|
| EE- 401 | Project Part-I | 0+3 |
| HS-404 | Foreign Language | 1+1 |
| EE-4XX | Depth Elective-III | 3+0 |
| HS-402 | Economics | 2+0 |
| EE-4XX | Depth Elective-IV | 3+0 |
| ME-416 | Renewable Energy Resources | 3+0 |
| EE-4XXL | Depth Elective-III Lab | 0+1 |
| EE-4XXL | Depth Elective-IV Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-8

| Course Code | Course Title | Credit hours |
|---------------------------|---------------------------------|--------------|
| EE-401 | Project Part-II | 0+3 |
| EE-4XX | Depth Elective-V | 3+0 |
| HS-401 | Professional Values & Ethics | 2+0 |
| HS-403 | Management and Entrepreneurship | 3+0 |
| ME-407 | Health Safety and Environment | 1+0 |
| Total Credit Hours | | 12 |



List of Electives (Power):

| Course Code | Course Title | Credit hours |
|-------------|-------------------------------------|--------------|
| EE-309 | Electrical Machine-II | 3+1 |
| EE-310 | Power Generation | 3+1 |
| EE-404 | Power Transmission and Distribution | 3+1 |
| EE-423 | High Voltage Engineering | 3+1 |
| EE-426 | Renewable Energy Systems | 3+0 |
| EE-428 | Electrical Machine Design | 3+1 |
| EE-429 | Power System Analysis | 3+1 |
| EE-431 | Power System Protection | 3+1 |
| EE-432 | Power System Operation and Control | 3+0 |

List of Electives (E&T):

| Course Code | Course Title | Credit hours |
|-------------|--|--------------|
| EE-306 | Digital Signal Processing | 3+1 |
| EE-311 | Digital Communications | 3+1 |
| EE-402 | Wave Propagation and Antennas | 3+1 |
| EE-403 | Computer Communication Networks | 3+1 |
| EE-409 | Optical Communication | 3+1 |
| EE-410 | Industrial Electronics | 3+1 |
| EE-417 | Embedded Systems | 3+1 |
| EE-427 | Wireless and Mobile Communications | 3+1 |
| EE-430 | Telecom Transmission and Switching Systems | 3+0 |
| EE-433 | AI Tools | 3+1 |
| EE-434 | Principles and Design of IoT systems | 3+1 |
| EE-435 | Electric Vehicles | 3+0 |



Course Contents

EE-101: Engineering Workshop

Introduction to various technical facilities including mechanical and electrical equipment; use of tools for electricians; types of cables, switches, plugs, circuit breakers, fuses, etc.; symbols for electrical wiring schematics; simple house wiring and testing methods; wiring schemes of one-way, two-way and electromechanical relay controlled circuits; voltage and current measurements; electric soldering and soldering tools; PCB designing, etching, drilling and soldering component; *and* PCB testing.

BS-104: Engineering Physics

Conductors, semi-conductors and insulators; energy bands; insulators used in electrical systems; super conductors; soft magnetic materials and permanent magnet materials; semi-conductor materials; PN-junction; fabrications; epitaxially grown, diffused and ion-implanted junction; depletion layer in zener, varactor and tunnel diodes; LED; laser diode; fiber optics; materials for sensors; *and* transducers and surface acoustic wave devices.

HS-101: English

Vocabulary (frequently confused/misused words, phrases, synonyms, antonyms, idioms and general vocabulary); practical use of business grammar (nouns, pronouns, verbs, adjectives, adverbs, prepositions, conjunctions, articles, interjections and tenses); sentences (types of sentences, parts of sentences, direct and indirect speech, active and passive voice and conditional sentences); reading, comprehension (extensive reading, intensive reading, skimming and scanning); composition; and summarization (descriptive, argumentative and persuasive skills in composition, comprehension, and précis writing).

EE-102: Electric Circuit Analysis

Basic concepts; energy and energy transfer; electric current and potential difference; power and energy; circuit theorems; transformer; network responses; complex impedance and admittance functions; tuned circuits; *and*

quality factor.

HS-103: Communication Skills

Principles of effective communication; concepts, benefits and characteristics of effective organizational communication; verbal and non-verbal communication; components of communication; problems of communication; intercultural communication in the global context; listening, speaking, reading and writing skills; presentation skills; seven C's of effective communication; communication and the technology context; *and* formal letters, memorandum, curriculum vitae (résumé), and business e-mails .

MT-103: Differential Equations

For contents, please refer to page number 149.

EE-103: Network Analysis

Pre-Requisite: Electric Circuit Analysis

Current and voltage transients; RLC circuits with DC and AC excitation; resonant circuit; series and parallel resonance in AC circuit; Phasor representation of alternating voltage and current; single-phase circuit analysis techniques; Mesh; Nodal; Superposition; source transformation; Thevenin's and Norton's theorem; two-port networks and their inter-connections; application of Laplace transform in circuit analysis; introduction to poly-phase generators; *and* phase sequence and vector diagrams for balanced and unbalanced three phase networks .

EC-110: Computing Fundamentals

For contents, please refer to page number 77.

EC-112: Object Oriented Programming

Evolution of Object Oriented Programming (OOP); Object Oriented concepts and principles; problem solving in object oriented paradigm; OOP design process, classes, and functions/methods; objects and encapsulation; constructors and destructors; operator and

function/method overloading; association, aggregation, composition, and generalization; *and* inheritance and its types, derived classes, and function/method overriding.

HS-201: Technical Report Writing

Introduction to technical writing; top down method; use of headings and chunks; visual aids; use of plain and objective language; format; codes of ethical conduct; pre-writing, writing and post-writing stages; editing; plagiarism; use of correct tone; echo techniques; extended definitions; comparing and contrasting; explaining cause and effect; description; *and* memos, proposals, applications, project reports, user manuals, and letters.

MT-201: Complex Variables and Transforms

For contents, please refer to page number 149.

MT-202: Numerical Methods

For contents, please refer to page number 149.

EE-203: Digital Logic Design

Introduction to number systems; Boolean algebra; logic gates (AND, OR, NOT, etc.); Karnaugh maps; QM method; combinational circuits; half and full adder; subtractor, comparator, encoder, decoder, multiplexer, and de-multiplexer; sequential circuits; Flip Flop, (RS, JK, D, T, Master Slave); state transition diagram; counters, registers, memories; PLAs; Programmable Logic Devices (PLDs); hardware descriptive language (HDL Verilog); gate-level, data flow, and behavioral modeling; *and* use of simulation software.

HS-203: Community Service.

It is a 45 hours contact program 15 hours of tutoring on Disaster Management, Community health, Leadership & Social Skills, First Aid, Traffic Awareness etc followed by 30 hours student work directly in the fields on their chosen project related to environment, education, health, community building, etc.



EE-204: Electrical Machines - I

Pre-Requisite: Electric Circuit Analysis

Basic principles of electromagnetism and simple linear machines; active, reactive, apparent, and complex powers; power factor measurement and improvement; need, construction, types and operation of power transformer; DC machinery fundamentals; DC motors; DC generators; *and* types of DC motors.

EE-205: Electronic Devices & Circuits

Pre-Requisite: College Physics/ Engineering Physics

Bipolar junction transistor; DC biasing schemes; transistor AC equivalent models; AC analysis of common emitter and common collector amplifiers; multistage amplifiers; differential amplifier; JFET characteristics and DC biasing; MOSFET characteristics and DC biasing; FET amplifiers and AC analysis; power amplifiers; amplifier frequency response; *and* operational amplifier-basics and characteristics.

ME-210: Engineering Mechanics

For contents, please refer to page number 63.

ME-211: Computer Aided Engineering Drawing

For contents, please refer to page number 61.

IS-211: Islamic Studies

For contents, please refer to page number 172.

HS-102: Pakistan Studies

For contents, please refer to page number 173.

EE-220: Fundamentals of Electrical Engineering

Introduction to DC, series, and parallel circuits; theory of alternating current; resistance, inductance, and capacitance of AC circuits; power factor; resonance in RLC circuits; current and voltage relationship in phase and line circuits; *and* types, characteristics and testing of motors and transformers.

EC-222: Data Structures & Algorithms

For contents, please refer to page number 78.

EE-301: Electromagnetic Theory

Pre-Requisite: Engineering Physics

Vector analysis Cartesian; cylindrical and spherical coordinate systems; transformations and inter-conversions between coordinate systems; differential length, area and volume; path, area and volume integrals in different coordinate systems; Del Operator, gradient, divergence and curl operations; classification of vector fields and divergence; Stokes's theorem, Coulomb's law, and Gauss's law; electric field; energy and potential; conductors and dielectrics; convection and conduction currents; polarization in dielectrics; equation of continuity and relaxation time; boundary conditions; Poisson's and Laplace's equations; uniqueness theorem; method

of images; magnetic field and forces; magnetization in materials; time-varying fields and inductances; Faraday's law; transformer and motional EMFs; displacement current and current densities; *and* Maxwell's equations in point, integral, and differential form.

EE-302: Signals & Systems

Pre-Requisite: Electric Circuit Analysis

Signals and Systems classification, models, and operations; time domain analysis of continuous-time and discrete-time systems; analysis of continuous-time systems using the Laplace Transform; discrete-time system analysis using the Z-Transform; *and* analysis of continuous-time signals using the Fourier Series and the Fourier Transform sampling theory.

MT-302: Probability and Statistics

For contents, please refer to page number 150.

MT-303: Applied Linear Algebra

For contents, please refer to page number 150.

EE-303: Microprocessor and Interfacing Techniques

Pre-Requisite: Digital Logic Design

Introduction to Intel x86 family of μ Ps; history and





applications; programming model; data addressing modes and assembly language programming; 8086 μ P pin functions; bus timings and interfacing techniques; introduction to AVR μ C, its history, and applications; μ C interfacing and project prototyping; *and* microcontrollers and their applications.

EE-304: Communication Systems

Amplitude modulation; baseband and carrier communications; Double Side Band (DSB); Single Side Band (SSB); Vestigial Side Band (VSB); super hetrodyne AM receiver; carrier acquisition, television, angle modulation, instantaneous frequency, bandwidth, generation, and demodulation of FM/PM; noise; mathematical representation; signal to noise ratio; noise in AM, FM, and PM systems; pulse modulation; sampling and quantization; pulse amplitude modulation; pulse

position and pulse width modulation; quantization noise; signal to quantization noise ratio; pulse code and delta modulation; *and* frequency and phase shift keying

EE-305: Linear Control Systems

Concept of feedback in control systems; modeling of electrical and mechanical systems; transfer function of systems; stability; evaluation of output of a system for various inputs; Root Locus; PID controller; Bode plots; *and* introduction to state space concepts.

EE-306: Digital Signal Processing

Pre-Requisite: Signals and Systems

Introduction to digital signal processing; discrete signals and systems; time-domain analysis of discrete-time signals; frequency-domain analysis; Fourier series and Fourier

transform; system response and frequency response; Z-Transform and its properties; digital filter design; Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters and their applications in signal processing; *and* real time digital signal processing.

EE-308: Electronic Systems Design

Pre-Requisite: Electronic Device and Circuits

Basics of operational amplifier, differential amplifier, op-amp circuits and op-amp responses; active filters, oscillators, and timers; voltage regulators; *and* special purpose amplifiers (instrumentation amplifiers, operational trans-conductance amplifiers, log and anti-log amplifiers)

EE-307: Instrumentation and Measurement

Pre-Requisite: Electronic Devices & Circuits

Engineering units and standards; galvanometer; DC ammeters; DC voltmeters; ohmmeters; DC meter calibration; half-wave and full-wave AC voltmeters; energy meters; transistor based electronic voltmeters; op-amp based electronic voltmeters; digital voltmeters and ammeters; frequency measurement; sensors and transducers; analog and digital interfacing of sensors and transducers; high voltage/current measurement; *and* sensors and IOT.

EE-309: Electrical Machines-II

Pre-Requisite: Electrical Machines-I

Transformers; three phase transformers; different types of connections; three phase transformation; transformer ratings; AC machinery fundamentals; power flows and losses; synchronous generators; power and torque; single and parallel operation; synchronous motors; steady state operations; torque speed characteristics; power factor correction; speed control; induction motors; construction; synchronous speed; slip; equivalent circuit; power and torque; losses; efficiency; torque speed characteristics; single phase motors; *and* induction generators

EE-310: Power Generation

Pre-Requisite: Electrical Machines-I

Introduction to different power plants; hydroelectric power plants; overview, advantages and disadvantages; schematic arrangement; choice of site, constituents, and problems; steam power station; nuclear power plants; gas and diesel power plants; solar and wind power generation; economic aspects; diversity factor, load factor, plant capacity factor, plant use factor, and load duration curve; tariff; power factor improvement; load scheduling; grounding systems; energy management and substations; *and* renewable energy.

EE-320: Analog and Digital Systems

Analog and digital signals and transmission; analog AM and FM; digital PCM, ADPCM and DM; digital data transmission; data encoding; clock recovery and BER; modulation techniques such as ASK, FSK, PSK and QAM and the effects of noise and bandwidth; modern satellite; *and* cellular and cable communication systems.

HS-401: Professional Values & Ethics

For contents, please refer to page number 173.

HS-402: Economics

Principles of engineering economy; scarcity and alternatives; opportunity cost of each choice; normative and positive economic analysis; consumer and producer goods; types of markets; demand law; supply law; price equilibrium; circular flow diagram; stakeholders; theory of firms' behavior; cost terminologies; cost curves; breakeven analysis; time value of money; methods of calculating interest; methods of depreciation; project cost control; numerical and graphical representation of breakeven; internal rate of return; payback period; discrete and continuous compounding; types of ownership; project feasibility analysis; macro economics; inflation; unemployment; *and* economic forces.

EE-402: Wave Propagation & Antennas

Pre-Requisite: Electromagnetic Theory

Wave fundamentals; plane waves; propagation modes; LOS wireless impairments; antennas; types of antennas; radiation mechanism; current distribution on a thin wire antenna; Thevenin equivalent model; antenna parameters; Faris transmission equation and radar range equation; receiving antennas reciprocity; matching and feeding networks; antennas in wireless technology; smith chart; determination of line impedance and admittance; impedance matching; dipole antenna and its radiation mechanism; micro strip patch antennas design; losses in antennas; dielectric substrates; permittivity; *and* loss tangent.

EE-403: Computer Communication Networks

Computer communication concepts; layered network architectures and protocol reference models; systems and technologies for physical layer; medium access control protocol; data link protocols; network layer functions and protocols; internet working concepts; LAN, WAN, and MAN; telecom networks; IP based networks and services; *and* TCP/IP suit of protocols.

HS-403: Management & Entrepreneurship

Introduction to management; a manager; roles and responsibilities of a manager; organizational structure and cultures; project management; technology management; strategic planning; SWOT analysis; porter forces; design of goods and services; operations and





production; workplace management; lean operations; Toyota production system; total quality management; 6 sigma quality; inventory management; process strategies; process of entrepreneurship; innovation concepts; and factors influencing entrepreneurship.

HS-404: Foreign Language (Chinese)

Introduction to Chinese Language: Variety of Chinese languages, Chinese Pinyin, Tones, Chinese Characters, Simplified and Traditional form of Chinese characters.

Introduction & Greetings: Students will learn about Chinese names, how Chinese people address each other and how profession titles are used.

Numbers: The basic counting system in Chinese. Chinese numbers from 1-100. The use of the measure words and quantifying objects. Chinese Currency, Money transactions in a bank.

Family: Members of the family, Family names and addressing different peoples.

Food: Names of different foods and drinks, interaction at a fruit shop. Ordering food at a restaurant.

Transportation & travelling: Different types of transport. Taking a bus, getting directions to a location.

Chinese Culture: Introduction to Chinese culture and history along with social norms.

HS-404: Foreign Language (Arabic)

Introduction to Arabic Language: The course covers grammar, reading and writing practice as well as an insight into the culture of the region. Students will learn the basics of the language and be able to build up enough knowledge to read and write at a basic level. Given the subtle differences between eastern and western cultures, it is beneficial to the students to be aware of such differences which are embedded in the language.

Introduction & Greetings. Students will learn about Arabic names, how Arabic people address each other and how profession titles are used

Numbers: The basic counting system in Arabic. Arabic numbers from 1-100. The use of the measure words and quantifying objects. Arabic Currency, Money transactions in a bank.

Family: Members of the family, Family names and addressing different peoples.

Food: Names of different foods and drinks, interaction at a fruit shop. Ordering food at a restaurant.

Transportation & travelling: Different types of transport. Taking a bus, getting directions to a location.

Arabic Culture: Introduction to Arabic culture and history along with social norms.

EE-404: Power Transmission & Distribution

Pre-Requisite: Power Generation

Overview of power system in Pakistan; one-line diagram; choice of voltage and AC/DC systems; types of conductors; skin effect; Ferranti effect; short, medium and long transmission lines; surge impedance loading; line supports; mechanical design; sag and tension calculation;



insulator material; types of insulators; string efficiency; corona effect; corona loss; radio interference due to corona underground cables; classification of HVDC transmission; distribution system; urban, suburban and rural distribution systems; primary, secondary and tertiary voltages; radial and ring main systems; disadvantages and causes of low power factor; heating and welding; *and* fundamentals of illumination engineering

EE-405: Power Electronics

Pre-Requisite: Basic Electronics

Principles of power electronics; converters and applications; power electronic devices; half-wave and full-wave rectifiers with resistive and inductive loads; thyristors—characteristics; working; gate driving circuits and protection; single-phase controlled rectifiers; DC to DC converters-buck; boost and buck-boost; DC switched mode power supplies; PWM inverters and their

voltage control techniques; three phase un-controlled and controlled rectifiers; power transistors; AC voltage controllers; *and* cyclo-converters.

ME- 407: Health Safety and Environment

For contents, please refer to page number 63.

EE-409: Optical Communication

Pre-Requisite: Communication Systems

Introduction to optical fiber communications; basic principles; Snell's law; numerical aperture (NA); Fresnel loss; fiber types; single mode and multimode; optical fiber losses (attenuation, dispersion, and polarization); special optical fibers; light sources (LED, LASER); light detection; components and connectors; link budget calculations; receiver design considerations; modulation schemes; OTDR, DWDM systems; *and* optical fiber preparation methods.

EE-410: Industrial Electronics

Pre-Requisite: Basic Electronics

Instrumentation and control; digital instrumentation techniques; analog and digital implementation of PID controllers; DC motor drives; modeling of DC motors; speed control; phase controlled converters; AC motor drives; induction motor model and operational characteristics; steady state and dynamic d-q model; scalar and vector control drives; PLCs architecture and I/O modules; ladder logic; programming; analog and digital signal interfacing; industrial communication; industrial networking; mod-bus and profi-bus; *and* SCADA system.

EE-311: Digital Communications

Pre-Requisite: Communication Systems

Significance of digital communication; probability and random variables; SNR and E_b/N_0 , sampling and quantization (uniform and non-uniform); detection of a binary signal in Gaussian noise; matched filters and correlators; Baye's decision criterion; maximum likelihood detector; error performance; Inter-Symbol Interference (ISI); root raised cosine pulse; equalization techniques; Gram-Schmidt orthogonality principle; performance analysis of M-array signaling techniques; Error correcting codes; block codes, design, and analysis of convolution codes; *and* advanced techniques for digital communication (DS-CDMA, FH-CDMA, OFDM, MIMO techniques).

EE-417: Embedded Systems

Pre-Requisite: Computing Fundamentals

Microprocessor and interfacing techniques; design of embedded digital systems; microcontrollers; embedded programs; real-time operating systems; design methodologies; hardware-software design; hardware modeling and computer-aided design; *and* prototyping with FPGAs.

EE-423: High Voltage Engineering

Pre-Requisite: Power Generation

High voltage engineering; withstand levels; S curves; insulation coordination; breakdown mechanisms in solids, liquids, gases, and vacuum; non-destructive testing of apparatus; insulation resistance; partial discharge measurements; life testing; accelerated life testing; Weibull statistics; system overvoltage occurrence and its characteristics; frequency and harmonics; switching; transients; Bewley lattice diagrams; wave tables; attenuation and distortion of surges; overvoltage protection; rod and expulsion gaps; surge diverters; circuit breakers aims, types and operation; HV testing; HV production for test objects; impulse generators; series resonant AC test sets; DC test sets; *and* absolute measurement methods.

EE-426: Renewable Energy Systems

Pre-Requisite: Power Generation

Fundamentals and main characteristics of renewable energy sources and their differences, compared to fossil fuels; technological basis for harnessing renewable energy sources; comparison of different renewable energy technologies; designing of renewable/hybrid energy





systems that meet specific energy demands; solar energy, wind energy, biomass, hydropower, wave energy, ocean thermal energy, tidal energy, and geothermal energy conversion; *and* environment and renewable energy.

EE-427: Wireless & Mobile Communication

Pre-Requisite: Communication Systems

Introduction to wireless communication systems; cellular system design fundamentals; wireless channel models; path loss; shadowing; multipath fading; wideband channel models; capacity of wireless channels; digital modulation; performance in wireless fading channels; diversity

(time, frequency, and space); equalization; multicarrier modulation (OFDM); spread spectrum (CDMA); cellular concept; frequency reuse; multiuser systems; *and* wireless networks.

EE-428: Electrical Machine Design

Pre-Requisite: Electrical Machines-II

Industrial standardization; national and international standards; testing laboratories; manufacturing; design considerations; properties and applications of materials for magnetic machine; insulation system and its design considerations; mechanical design considerations; specific loading and output; induction motor; introduction to computer aided design (CAD) and computer aided manufacturing (CAM); safety precautions; troubleshooting and emergency repairs; *and* installation, commissioning, testing, maintenance, and troubleshooting of power transformers, induction motors, and AC generators.

EE-429: Power System Analysis

Pre-Requisite: Power Transmission and Distribution

Introduction to power system analysis; complex power flow; per unit system; single line diagram; impedance and reactance diagram; bus admittance and bus impedance matrix; power flow solution methods and comparison; symmetrical fault analysis; sequence components; unsymmetrical faults; *and* power system stability analysis.

EE-430: Telecom Transmission and Switching Systems

Pre-Requisite: Communication Systems

Telecommunication transmission systems; routing techniques; line encoding techniques; types of switching circuits; message and packet switching; telecommunication networks (PST and PLMN); digital switches; telecom traffic models; PABX and public exchange traffic; GoS; blocking probabilities; signaling system # 7 (CCS7 or SS7); protocol

architecture; mapping with OSI model, MSU, LSSU, and FISU; *and* next generation networks.

EE-431: Power System Protection

Pre-Requisite: Power Transmission & Distribution

Power generation; types of faults; fuse as protective device; types of fuses; CT and its operation; arc voltage, arc interruption, re-striking, and recovery voltage; resistance switching; current chopping circuit breaker; circuit breakers; relays; over-current protection; differential protection of transformers; types of faults in transformer; balanced earthed fault protection; stator inter turn fault protection; bus bar protection; voltage surges; lightning; mechanism of lightning discharge; types of lightning strokes and protection; earthing screen; *and* overhead ground wires.

EE-432: Power Systems Operation & Control

Pre-Requisite: Power Generation

Characteristics of power generation units; economic dispatch with and without taking transmission loss into account; unit commitment; hydro-thermal coordination; introduction to power system control and its importance; generation capacity; voltage and frequency control; SCADA system and its application in the power system operation and control; *and* system operation in deregulation environment.

EE - 433: AI Tools

Pre-Requisite: Linear Control System

Introduction (Introduction, basic component of AI, Identifying AI systems, branches of AI, etc.); Reasoning and Knowledge Representation (Introduction to Reasoning and Knowledge Representation, Propositional Logic, First order Logic); Problem Solving by Searching (Informed searching, Uninformed searching, Local searching.); Constraint Satisfaction Problems; Adversarial

Search (Min-max algorithm, Alpha beta pruning, Game-playing); Learning (Unsupervised learning, Supervised learning, Reinforcement learning); Uncertainty handling (Uncertainty in AI, Fuzzy logic); Recent trends in AI and applications of AI algorithms (trends, Case study of AI systems, Analysis of AI systems)

EE-434 Principles and Design of IoT systems

Pre-Requisite: Instrumentation & Measurement

Introduction & Motivation, IoT Around Us, Sensors, Multi-sensor Systems and Calibration, IoT System Overview, Power management & Batteries, Understanding Microprocessors, Microprocessors for IoT Sensors: An Overview, Microcontrollers for IoT Sensors: Resources and Processes, Representation of Numbers, Networking and IoT, esign review of certain aspects of oblu, Big Data, Hadoop and Map Reduce, Revisiting Arduino, An Introduction to Raspberry Pi.

EE-435 Electric Vehicles

Pre-Requisite: Control System

Fundamentals of hybrid electric, hybrid hydraulic and electric vehicle engineering with specific applications to commercial vehicles, including highway and terrain trucks, buses, mining and forestry machinery, farm tractors and construction equipment, combat and tactical military vehicles, unmanned ground vehicles, planet rovers. The course focuses on mechatronic system and component design of HEV based on the requirements to power flow management, power conversion and thus to vehicle dynamics and energy/fuel efficiency. Mechanical drive train engineering problems are considered in conjunction with electric drive design and then mechatronic wheel-electric drive, suspension and locomotion System design are presented. The course discusses design of batteries and energy storages and vehicle power electronics and also introduces plug-in hybrid electric vehicles.

BS Biomedical Engineering (Tentative)

BS Biomedical Engineering is a multi-disciplinary bachelor degree program which is designed according to the guidelines of the Higher Education Commission of Pakistan (HEC) and the Pakistan Engineering Council (PEC). The program spans over eight semesters (four years) and the degree of BS Biomedical Engineering shall be conferred to students after they have demonstrated satisfactory performance in coursework, laboratory sessions and the final year project. The program has courses related to electronic engineering at the preliminary stage and later gets diversified covering

multidisciplinary topics with exposure to both engineering and medical laboratories.

Areas of studies include bio electronics, biomedical signal processing, biomedical physics, bio materials, physiology, anatomy, etc. The curriculum is comprehensive and meets the challenges and requirements of biomedical engineering both locally and globally. The objective of the program is to train the students such that they become capable to take up leading roles in hospitals, industries, government organizations, R&D institutions and academia.

Curriculum

Semester-1

| Course Code | Course Title | Credit hours |
|-------------|--|--------------|
| BS-105 | Applied Physics | 2+0 |
| BS-105L | Applied Physics Lab | 0+1 |
| EC-110 | Computing Fundamentals | 2+1 |
| EE-101 | Basic Electrical Engineering | 3+0 |
| EE-101L | Basic Electrical Engineering Lab | 0+1 |
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| BS-103 / | Basic Biology/ | 2+0 |
| MT 100 | Basic Mathematics | |
| BM-101 | Introduction to Biomedical Engineering | 1+0 |
| HS-102 | Pakistan Studies | 2+0 |
| | Total Credit Hours | 18 |

Semester-2

| Course Code | Course Title | Credit hours |
|-------------|-----------------------------|--------------|
| IS-211 | Islamic Studies | 2+0 |
| MT-303 | Applied Linear Algebra | 2+0 |
| BM-112 | Physiology I | 2+0 |
| BM-112L | Physiology I Lab | 0+1 |
| EE-112 | Circuit Analysis | 3+0 |
| EE-112L | Circuit Analysis Lab | 0+1 |
| EC-112 | Object Oriented Programming | 2+1 |
| BM-113 | Human Anatomy | 2+0 |
| BM-113L | Human Anatomy Lab | 0+1 |
| | Total Credit Hours | 17 |

Semester-3

| Course Code | Course Title | Credit hours |
|---------------------------|------------------------------------|--------------|
| MT-201 | Complex Variables & Transforms | 3+0 |
| BM-211 | Physiology II | 2+0 |
| BM-211L | Physiology II Lab | 0+1 |
| BM-202 | Biochemistry | 2+0 |
| BM-202L | Biochemistry Lab | 0+1 |
| EE-211 | Basic Electronics | 3+0 |
| EE-211L | Basic Electronics Lab | 0+1 |
| ME-211 | Computer-Aided Engineering Drawing | 0+1 |
| HS-103 | Communication Skills | 3+0 |
| HS-203 | Community Service | 0+1 (NC) |
| Total Credit Hours | | 17 |

Semester-5

| Course Code | Course Title | Credit hours |
|---------------------------|---|--------------|
| BM-311 | Biomedical Instrumentation I | 3+0 |
| BM-311L | Biomedical Instrumentation I Lab | 0+1 |
| HS-201 | Technical Report Writing | 3+0 |
| MT-302 | Probability and Statistics | 3+0 |
| EE-303 | Microprocessor and Interfacing Techniques | 3+0 |
| EE-303L | Microprocessor and Interfacing Techniques Lab | 0+1 |
| BM-312 | Biomedical Signal Processing | 3+0 |
| BM-312L | Biomedical Signal Processing Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-4

| Course Code | Course Title | Credit hours |
|---------------------------|----------------------------|--------------|
| BM-213 | Biomedical Electronics | 3+0 |
| BM-213L | Biomedical Electronics Lab | 0+1 |
| EE-203 | Digital Logic Design | 3+0 |
| EE-203L | Digital Logic Design Lab | 0+1 |
| MT-103 | Differential Equations | 3+0 |
| BM-214 | Biomechanics | 2+0 |
| BM-214L | Biomechanics Lab | 0+1 |
| EE-302 | Signals and Systems | 3+0 |
| EE-302L | Signals and Systems Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-6

| Course Code | Course Title | Credit hours |
|---------------------------|-----------------------------------|--------------|
| BM-313 | Biomedical Instrumentation II | 2+0 |
| BM-313L | Biomedical Instrumentation II Lab | 0+1 |
| MT-202 | Numerical Methods | 2+1 |
| BM-314 | Biomedical Control Systems | 3+0 |
| BM-314L | Biomedical Control Systems Lab | 0+1 |
| BM-XXX | Elective-I | 3+0 |
| BM-315 | Biomaterials | 3+0 |
| BM-315L | Biomaterials Lab | 0+1 |
| Total Credit Hours | | 17 |

Semester-7

| Course Code | Course Title | Credit hours |
|---------------------------|---------------------------------|--------------|
| HS-403 | Management and Entrepreneurship | 3+0 |
| BM-411 | Medical Imaging | 2+0 |
| BM-411L | Medical Imaging Lab | 0+1 |
| CS-31X | Modeling & Simulation | 2+1 |
| BM-XXX | Elective-II | 3+0 |
| BM-XXX | Elective-III | 2+1 |
| BM- 401 | Project Part-I | 0+3 |
| Total Credit Hours | | 18 |

Semester-8

| Course Code | Course Title | Credit hours |
|---------------------------|----------------------------------|--------------|
| BM-XXX | Elective-IV | 2+1 |
| HS-401 | Professional Values & Ethics | 2+0 |
| BM-XXX | Elective-V | 2+1 |
| BM-401 | Project Part-II | 0+3 |
| HS-402 | Economics | 2+0 |
| HS-404 | Introduction to Foreign Language | 1+1 |
| ME-407 | Health Safety and Environment | 1+0 |
| Total Credit Hours | | 16 |

List of Electives:

| Course Code | Course Title | Credit hours |
|-------------|---------------------------------------|--------------|
| BM-412 | Biomedical Engineering Systems | 3+0 |
| BM-413 | Medical Device Quality and Standards | 3+0 |
| BM-414 | Power Electronics | 2+1 |
| BM-415 | Medical Robotics | 2+1 |
| BM-416 | Rehabilitation Engineering | 2+1 |
| BM-417 | Bioelectricity | 2+1 |
| BM-418 | Biophysics | 2+1 |
| BM-419 | Biofluid Mechanics & Bioheat Transfer | 2+1 |
| BM-420 | Artificial Intelligence | 2+1 |
| BM-421 | Biomedical Image Processing | 2+1 |



Course Contents

BS- 105: Applied Physics

Properties of matter, elasticity and modulus of elasticity, experimental determination of Young's modulus, bending of beams, cantilever, fluids, steady and turbulent flow, Bernoulli's theorem, viscosity, determination of coefficient of viscosity by Poiseuille's method, surface tension, surface energy, angle of contact, determination surface tension by rise in a capillary tube, heat & thermodynamics, heat, temperature and theory of heat, adiabatic and isothermal processes, the four laws of thermodynamics, efficiency of heat engines, Carnot's cycle, entropy, reversible process and cycles, thermodynamic equilibrium, introduction to heat transfer mechanisms, optics, waves and oscillations, simple harmonic motion, types of wave motion, optics of light, interference, diffraction, polarization, double refraction, dispersion, types and uses of deviation lasers, electricity and magnetism, magnetic properties of matter, magnetic field, magnetic force on current, Ampere's law, Faraday's law, and Lenz's law, sound, hearing and echolocation, ultrasound.

MT-103: Differential Equations

For contents, please refer to page number 149.

MT- 100: Basic Mathematics

Algebra, complex numbers, properties of complex numbers, conjugates and modulus, geometrical representation of complex numbers, quadratic equations, roots of a quadratic equation, formation of quadratic equations, matrices, determinants, arithmetic progression, arithmetic means, geometric progression, sum of infinite geometric series, geometric means, binomial expansion, partial fractions, trigonometric function, trigonometric identities, sum and difference formulae, multiple angle formulae, differential calculus, limits, basic concepts of limit, exponent functions, differentiation, higher order derivatives, applications of differentiations, minima and maxima, tangent and normal velocity and acceleration, integral calculus, basic integration, trigonometric, exponent and logarithmic functions, integration by parts, substitution method, coordinate geometry, different forms of equation of a line.

BS- 103: Basic Biology

Cell structure and function, techniques used in cell biology, cell wall and plasma membrane, the boundary wall, cytoplasm and organelles, prokaryotic and eukaryotic cells, biological molecules, biological molecules in protoplasm, importance of water and protoplasm, carbohydrates proteins lipids nucleic acids, conjugated molecules, enzymes, structure of enzymes, mechanism of enzyme action, factors affecting the rate of enzymatic action, enzyme inhibition, classification of enzymes, bioenergetics, aerobic and anaerobic respiration, mechanism of respiration, synthesis of ATP, chemiosmosis and substrate-level phosphorylation, biodiversity, a cellular life, prokaryotes, diversity among animals, digestion, circulation, immunity, respiration, homeostasis, support and movement, nervous coordination, chemical coordination, continuity in life, reproduction, development and aging, inheritance, chromosome and DNA, evolution, application of biology, gene cloning, role of microbes in human welfare.

BM- 101: Introduction to Biomedical Engineering

Biomedical engineering and its branches, role of biomedical engineer, devices used in biomedical engineering, biomedical instrumentation fundamental, critical care devices used in biomedical engineering, radiological instrumentation, diagnostic biomedical devices, therapeutic biomedical devices, applications of biomedical engineering, rehabilitation engineering, physiological modeling and simulation, biomedical signal processing, clinical engineering, biomaterials, biomechanics, tissue engineering and regenerative medicine, neural engineering, medical image processing.

BM-112: Physiology-I

Cell and general physiology, functional organization of human body and control of the internal environment, cell and its function, protein synthesis and cell reproduction, metabolism of carbohydrates and formation of ATP, transport through cell membrane, human physiology, cardiovascular, respiratory, renal and digestive systems, nerve and muscle, membrane potential, action potential, excitation and rhythmicity,

contraction of skeletal and cardiac muscles, sliding filament mechanism, heart as a pump, sensory systems, sensory receptors, classification and basic mechanism of action, somatic sensations, mechanoreceptive sensations, pain, thermal and visceral pain, headache, special senses, eye, receptor function of the retina, neurophysiology of vision, the chemical sense-taste and smell.

BM-113: Human Anatomy

Introduction to anatomy and its branches, anatomical positions, planes, topography, cell anatomy, overview of cellular anatomy, extremities (upper and lower), bones, muscles, ligaments, tendons, bursae, reticulae capsules, arteries, veins, lymphatic system, vertebral anatomy, vertebrae, pelvic girdle, spinal cord, nervous system, thorax-thoracic viscera, surface anatomy, bones surface musculature, lungs, heart, abdomen, organs location, structures, relations and function, head & neck, bones, muscles, cranial nerves.

BM-211: Physiology II

Nervous system, organization of nervous system, basic functions of synapses, neuronal mechanism and circuits for processing information, motor functions, spinal cord and the cord reflexes, the cerebral cortex and intellectual functions of the brain, motor function of the brain stem, vestibular control of postural reflexes, cerebrum and basal ganglia, reticular, somatic sensations, mechanoreceptive sensations, pain, thermal and visceral pain, headache, behavioral functions of the brain, limbic system, role of the hypothalamus, control of the vegetative functions of the body, the autonomic nervous system, adrenal medulla, electrical activity from brain, endocrinology and reproduction, introduction to endocrinology and the pituitary hormones, hormonal functions in male and female.

BM-202: Biochemistry

Introduction to biochemistry, colloidal state, buffer, pH, significance of pH Henderson equation, surface tension, viscosity, osmosis, diffusion, biological membrane, active transport, chemi-osmotic theory-passive transport concept of chromatographic techniques, carbohydrates, amino acids,

nucleic acids, proteins, vitamins, enzymes, hormones & signaling agents, metabolism of carbohydrates, lipids and proteins, enzymes, conformational analysis and forces that determine protein and nucleic acid structure, molecular modeling of protein, digestion of carbohydrates, metabolism of carbohydrates, glycolysis, regulation of metabolism, overview and reactions of glycolysis, hormonal regulation of glycolysis, tricarboxylic acid cycle, reactions of TCA energy and regulation of TCA cycle, bioenergetics, thermodynamic principles in human body, thermodynamics of phosphate compounds (phosphate transfer reactions) and role of ATP for biological energy transfer, thermodynamics of life, metabolism of lipids, digestion, absorption and secretion, utilization of dietary lipids.

HS-203: Community Service.

For contents, please refer to page number 25.

BM-213: Biomedical Electronics

Operational amplifiers, analysis of op-amp, op-amp specifications, interpreting op-amp data sheet, offset voltage and current, temperature rating, output swing, gain, CMRR, basic op-amp configuration circuits, inverting amplifiers, non-inverting amplifiers, voltage follower, summing amplifiers, integrator and differentiator, instrumentation amplifiers, sensing and measuring with the instrumentation amplifier, instrumentation amplifier as a signal conditioning circuit, active filters design, basic low pass filters, introduction to butter-worth filters, high-pass and band-pass, butter-worth and, notch filters, A/D and D/A converters, selected applications of op-amps in biomedical engineering, signal acquisition and conditioning of ECG signals using op-amps.

HS-102: Pakistan Studies

For contents, please refer to page number 173.

BM-214: Biomechanics

Introduction, review of statics, review of dynamics, review of deformable body mechanics, visco elasticity, material properties, anthropometry, density, mass and inertial properties, direct measurement of anthropometric parameters, muscle anthropometry, mechanical advantage of muscle, multipoint muscles, kinematics of human

movement, forms of motion, standard reference systems and joint movement terminology, spatial reference systems, qualitative vs. quantitative analysis of human movement, limb-segment angles, joint angle, linear and angular velocities and acceleration, tools for direct/indirect measurement of kinematic quantities, the biomechanics of human bone growth and development, composition and structure of bone tissue, material constituents, structural organization, types of bones, bone growth and development, longitudinal growth, circumferential growth, adult bone development, bone response to stress, bone modeling and remodeling, bone hypertrophy, bone atrophy, osteoporosis, kinetics of human movement, link segment models, joint reaction forces, direct force measurements, biomechanics of upper & lower extremity.

MT-302: Probability and Statistics

For contents, refer to page number 150.

BM-311: Biomedical Instrumentation I

Introduction to measurements, bio-potentials, biosensors and transducers, biomedical signals of the human body, sensors and transducers for bio-potential measurements, problems encountered in measuring bio-potentials of the human body,

invasive and noninvasive measurement techniques and related equipment, functional building blocks of a biomedical instrumentation system, cardiovascular system devices, diagnostic, electrocardiography, measurement of blood pressure, blood flow, therapeutic, cardiac output, defibrillator, pacemaker, pulmonary system devices, diagnostic, pulmonary function analyzer, spirometry, ventilation monitors, respiration, pulse oximetry, capnography, therapeutic, ventilators, heart lung machine, nebulizer, musculoskeletal & nervous system devices, EMG, EEG, critical care devices, patient monitoring, electrosurgical unit, genito-urinary system devices, hemodialysis machine, quality assurance and quality control, common defects in medical equipment, performance measurement, calibration, maintenance and repair.

BM-312: Biomedical Signal Processing

Introduction to digital signal processing, analog-to-digital & digital-to-analog conversion, digital signals, systems, and difference equations, realizations of digital systems, time domain analysis, digital convolution, auto and cross correlation, discrete system stability, the Z-transforms, discrete time Fourier transform, Fast Fourier transform, FIR filter design using window method, infinite impulse response



filter design, IRR filter design, ECG rhythm analysis, maternal interference in fetal ECG, EEG wave-shape and wave-complexity, analysis of event related potentials, coherence analysis, detection of EEG rhythms, PPG wave analysis, sound wave analysis, EMG processing.

BM-313: Biomedical Instrumentation II

Centrifugation techniques, electrochemical methods of analysis, electrophoresis, blood banking and transfusion, chromatography, liquid chromatography, gas chromatography, high performance liquid chromatography, clinical chemistry analyzer, automated cell counter, spectroscopy, spectrophotometer, flame photometry, mass spectrometry, infrared spectrometry, nuclear magnetic resonance spectroscopy, microscopy, electron microscopy, atomic force microscopy, confocal microscopy.

BM-314: Biomedical Control Systems

Open and closed-loops systems, types of feedback, mathematical models of mechanical systems using free body diagrams, poles-zero map and transfer functions, block diagram reduction and transformations, signal flow graphs, Mason's gain formula, continuous-time response, order and type, response of first and second order systems, transient response performance specifications, type of damped responses, steady state error, frequency response, amplitude ratio and phase, bode plots, stability of systems using Routh-Hurwitz criteria, root locus properties and techniques, PID controllers.

BM-315: Biomaterials

Introduction to biomaterials science, overview of types of implantable biomaterials and devices, properties of biomaterials, general concepts, polymeric biomaterials, basic principles, biological materials, structure and properties, hard tissues, tooth and bone, soft tissues, skin, blood vessel, tendon, mechanical properties of biomaterials, biomechanics of arthroplasty, biomaterials degradation in the biological environment, biological responses to biomaterial, tumors associated with biomaterials and implants special considerations for implants, devices and biomaterials, sterility and patient safety, device failure mode analysis/risk analysis,

voluntary consensus standards and regulatory compliance, legal aspects of biomaterials, clinical trials and case studies in regulations, tissue engineering, gene therapy using viral vector materials for scaffolding, biomaterial implantation and acute inflammation, wound healing and the presence of biomaterials, immune response to biomaterials, biomaterials and thrombosis, infection, tumor genesis and classification of biomaterials.

ME-407: Health Safety and Environment

For contents, please refer to page number 63.

BM-411: Medical Imaging

X-ray imaging, physics of X-ray, radiation dose, attenuation based X-ray imaging, X-ray detection, X-ray image quality, diagnostic applications of X-ray imaging, demonstration of X-ray equipment, introduction to computed tomography and scanners, attenuation tomography, time of flight tomography, reflection tomography, diffraction tomography, formulation of attenuation computed tomography, Fourier slice theorem, physical and physiological principle of magnetic resonance imaging, MR imaging, formulation of MRI reconstruction, functional MRI, bold MRI, applications of MRI and FMRI, ultrasound imaging, Doppler ultrasound imaging, modes of ultrasound image representation, ultrasound image artifacts,



Positron Emission Tomography, physical and physiological principles, signal acquisition and applications.

BM-412: Biomedical Engineering Systems

Principle of electronic instrumentation, bio-potential measurements, electrical and electronic device design for biomedical engineering, laboratory experience to design devices for taking measurements of living systems, skeletal and cardiovascular implant design, selection of material, stress and functional analysis, failure criteria, fatigue analysis, and optimal design, case studies, computer aided design methods, design of subsystems, tools computational methods and tools in design and analysis, 3-D modeling and simulation, systematic approach for creation of virtual 3-D models, visualization and physical simulation, matrix transformations, geometric modeling, design of artificial organs and prostheses, product development, product development for solving biomedical, biotechnological and ergonomic problems.

BM-413: Medical Device Quality and Standards

Quality management system, general requirements, quality manual, control of documents, controls of records, management responsibility and resource, management commitment requirement, planning, responsibility, authority and communication, provision of resources, infrastructure and work environments, product realization, planning of product realization, customer related processes, design and development, purchasing, production and service provision, validation of processes of production, identification and traceability, control of monitoring and measuring device.

BM-415: Medical Robotics

Fundamentals of robot, classification of robots and applications, social issues, robot kinematics, matrix representation, homogeneous transformation matrices, representation of transformations, representation of forward kinematic equations of robots, the inverse kinematic solution of robots, inverse kinematic programming of robots, the fundamental problem with the Denavit-Hartenberg representation, differential motions and velocities, differential relationships, differential motions of a robot and its hand

frame, calculation of the Jacobian, effective moments of inertia, dynamic equations for multiple-degree-of-freedom robots, static force analysis of robots, transformation of forces and moments between coordinate frames, basics of trajectory planning, joint space trajectory planning, Cartesian space trajectories, application of robotic in BME, introduction to medical robotics, mechanisms for medical robots, sensing for medical robots, actuators for medical robots, controls for medical robots, interfaces for medical robots.

BM-416 Rehabilitation Engineering

Introduction to rehabilitation engineering and assistive technology (AT), domains of rehabilitation engineering, future of rehabilitation engineering, limb prosthetic devices, classification of amputation, prosthetic prescription and fabrication, biomechanical principles of orthoses, design consideration, general purpose assistive technology solutions, task-specific assistive technologies, technology for reading, writing and graphic access, devices for hearing impairment, types of hearing impairment, historical overview of hearing assistance technology, medical and surgical approaches to restoring hearing function, assistive listening devices solutions, environmental adaptations and universal designs, wheelchairs, manual wheelchairs and electrical power wheelchairs, multifunctional wheelchairs, neuro-rehabilitation, functional electrical stimulation, transcutaneous electrical stimulation, brain computer interface, assessment methods for neuro-rehabilitation.

BM-417 Bioelectricity

Introduction and excitation models, impedance and current distribution, electrical principles of nerve and muscle function, excitation models, electrical stimulation, electrical properties of the heart, cardiac sensitivity to electrical stimulation, sensory responses to electrical stimulation, skeletal muscle response to electrical stimulation, stimulation via electric and magnetic fields, deep brain stimulation, electroconvulsive therapy, application of electrical stimulation, TENS for pain management, TENS equipment, techniques, and biophysical principles, appropriate electrode sites and electrical characteristics for TENS, mechanism of action of TENS, the use of TENS for non-painful conditions, functional electrical stimulation, bio-signal control based electrical stimulation.

BM-418 Biophysics

Optics of vision, quantum nature of vision, visual sensation, bipolar cells and the generation of contrast coding, visual transduction parallel processing, receptive fields, ocular dominance, biophysics of hearing, nervous system, biophysics of neural spike, structural biophysics, membrane biophysics, bioenergetics, thermodynamics, free energy, standard physical free energy, standard biological free energy, determination of the free energy from equilibrium constant and EMF measurements, thermodynamics of phosphate compounds, role of ATP for biological energy transfer, thermodynamics of life, energy pathways, coupled reactions, group transfer potential, role of pyridine nucleotides, energy conversion pathways, chemi-osmotic theory, muscle biophysics, skeletal muscle structure, muscle type, muscle ultra structure, neuromuscular junction, excitation-contraction coupling, skeletal muscle mechanics, muscle energetic, heat production, energy metabolism, muscle energetic respiratory biophysics, neurological control respiratory system, neural mechanisms, chemical mechanisms, alternation of blood gases, acid base balance, buffer system, lung diseases.

BM-419: Biofluid Mechanics & Bioheat Transfer

Fluid mechanics and biofluid mechanics, elemental stress, pressure and viscosity, fluid motions, two phase flows, fluid structure interaction, introduction to turbulent flow the relation the relationship of turbulence to biological systems, fluid statics equations, buoyancy, conservation of mass, conservation of momentum, momentum equation with acceleration, laws of thermodynamics, the Navier stokes equations, Bernoulli equations, macrocirculation and microcirculation, microscale heat transfer, bioheat transfer, application of magnetic field in hyperthermia, application of ultrasonic wave.

BM-420: Artificial Intelligence

Foundations of AI, agents and environments, structure of agents, problem solving agents, searching for solutions, uninformed search strategies, informed search strategies, informed (heuristic) search strategies, introduction to reasoning and knowledge representation, reasoning with uncertainty & probabilistic reasoning, Bayes' rule, decision trees, the ID3 algorithm and statistical learning.

BM-421 Biomedical Image Processing

Digital image fundamentals, introduction to the mathematical tools used in digital image processing, intensity transformations and spatial filtering, filtering in the frequency domain, review of 1D and 2D Fourier transforms, image smoothing using frequency domain filters, image sharpening using frequency domain filters, image restoration and reconstruction, periodic noise reduction by frequency domain filtering, inverse filtering, least squares filtering, image reconstruction from projections, biomedical image segmentation, point, line, and edge detection, thresholding, region-based segmentation, segmentation using watersheds, introduction to image compression.



Laboratories

Students are provided with the opportunity of augmenting their theoretical learning through practical work in the state-of-the-art laboratories. These labs are fully equipped, adaptable, reconfigurable, and modular; making them ideally suited for conducting lab experiments designed in coherence with theory, and undertaking research in the fields of Electronics, Telecommunication, Signal Processing, Control Systems, Power Engineering, etc.

The Department of Electrical Engineering has following fourteen well maintained laboratories for the subject programs:

Electronics Lab: Electronics Lab is equipped with diodes, transistors, operational amplifiers, oscilloscopes, power supplies, and function generators to help students practically implement the theoretical concepts of electronic systems.

Digital Systems Lab: Digital Systems Lab is designed to help students understand the digital logic concepts; and consists of oscilloscopes, digital trainers, digital multi-meters, function generators, 8086 microprocessor kits, and supporting accessories. This lab is also used to aid practical implementation of microprocessor and interfacing techniques.

Communication Systems Lab: Communication Systems Lab helps the students to envision the theoretical communication concepts of both analog and digital communication systems. This laboratory contains different analog and digital communication trainers.

DSP & VLSI Lab: Digital Signal Processing and Very Large Scale Integration Lab utilizes advanced signal processing tools such as MATLAB, Xilinx, and LABVIEW, to visualize various signal processing techniques including convolution, DFT, FFT, and digital filters designing techniques. DSP kits, TMS 320C6713 DSK, are also provided for advanced stage practical implementations.

Wave-Propagation & Antennas Lab: Wave-Propagation and Antennas Lab comprises of various types of trainers including wave-propagation, microwave-communication, antennas, satellite-communication, and waveguide trainers. These trainers are suitable for the study of generation, propagation, and reception of microwave signals.

Control Systems Lab: Control Systems Lab consists of multiple workstations, each equipped with an oscilloscope, digital multi-meter, PID trainers, control system trainers, inverted-pendulum, ball and beam control, and magnetic-levitation trainers. This lab also caters for the industrial implementation of advanced control systems via different computer tools such as MATLAB and Simulink.

Electrical Machines Lab: Electrical Machines Lab provides the students with the opportunity to supplement their concepts about the fundamentals of transformers and rotating machines. The lab is equipped with various test and monitoring equipment, DC series shunt motor, compound motor, universal motor, single-phase induction motor, single-phase transformer, three-phase induction motor, three-phase synchronous motor, and three-phase transformer.

Computer Networks Lab: This lab is furnished with data communication LAN, WAN, and MAN trainers and offers students the opportunity to perform practical experiments on data communication techniques and networking methodologies.

Power Generation and Protection Lab: Power Engineering Lab ministers to the improvement of the students' practical skills in the fields of Electrical Power Systems, Electrical Power Generation, and Power System Protection.

Electronic Workshop Lab: Electronic Workshop Lab provides the students with hands on experience of using different electronic measuring equipments such

as oscilloscope, Megger, analog/digital multi-meter, and single/three-phase watt-meters. The lab is also utilized for a variety of engineering subjects including Engineering Workshop, Electric Circuits, Network Analysis, and Instrumentation and Measurement.

Computing Lab: It is a lab for computer programming-oriented subjects like Structured C, Object Oriented Programming, Java, Computer-aided Engineering Drawing, etc. High speed computers have been installed to provide computing facilities for the aforementioned courses.

Information Technology Lab: This lab provides students with the facilities of high speed internet access, browsing, and surfing to complete their assignments, etc.

Power Transmission and Distribution Lab: Power Transmission and Distribution Lab provides an opportunity to advance the practical skills of the students in the field of Electrical Power Systems, Electrical Power Transmission, and Electrical Power Distribution.

Project Lab: This lab is completely apportioned to the development of projects by final year students and to mini or open-ended projects by the students of Electrical Engineering Department.

High Voltage Lab: High Voltage Lab is equipped with stage 3-Impluse generators, and DC and AC systems in addition to partial discharge detection instruments.

Applied Physics Lab: The Applied Physics Lab contains equipment related to different sub-fields of physics such as, thermodynamics, fluid mechanics, electromagnetism and optics. The purpose of this lab is to facilitate students to practically verify the concepts studied in theory.

Biocomputing Lab: The Biocomputing Lab is equipped with the latest workstations to support the students working in different areas of biomedical engineering. A variety of

educational software tools are available to help students learn and practically implement knowledge acquired in different courses related to computer programming, signal processing, biological simulations and image processing.

Biomechanics Lab: The Biomechanics Lab contains equipment and tools to help the students attain practical hands-on experience about dynamometry, center of gravity analysis, gait analysis, kinetic and kinematic analysis. In addition, dedicated software is also available in the lab to simulate mechanics of human body and body parts.

Bioinstrumentation Lab: The Bioinstrumentation Lab is equipped with state-of-the-art trainers containing EEG, ECG, EOG, EMG, Photoplethysmogram, pulse meter and respiratory modules to help students gain practical insight about the use of these modules in real-life scenarios and how doctors use them in hospitals. The facilities in this lab can also be used to carry out research by faculty and students.



MS Electrical Engineering

The Department of Electrical Engineering also offers MS program which essentially entails specialization in Communication Systems, Digital Signal Processing, and Electrical Power and Control Systems.

The MS program in Communication Systems involves studying advanced courses like Wireless Communications, Digital Modulation Techniques, Secure Communication, Telecommunication, Switching, and Cryptography. While, the MS program in Signal Processing deals with advanced courses such as DSP, Digital Image Processing, Adaptive Signal Processing, Computer and Machine Vision, and Advanced Computer Networks. The MS program in Electrical Power and Control Systems, on the other hand, exposes the students to Electrical Power Systems, Machine Drives, High Voltage Engineering, Renewable Energy, Linear Control Systems, Robust Control, Adaptive Control, and Fuzzy Control Systems.

A student is required to study eight advanced courses and complete a research thesis of six credit hours on the assigned topic. Although the Department exhorts all MS students to opt for research thesis; still, an option is available to take two additional courses in lieu of thesis to qualify for the award of degree.

An MS degree in Electrical Engineering from HITEC University opens the doors for excellent job opportunities in telecommunication, power sector, and process industries as well as strategic organizations in the country and abroad. MS qualified electrical engineering postgraduates are also readily accepted in academic institutions.

PhD Electrical Engineering

PhD in Electrical Engineering is offered as per the guidelines of Higher Education Commission (HEC). The desirous candidates must possess MS degree (18 years) with a minimum CPGA of 3.00, out of 4.00.

The program comprises of 18 credit hours of coursework and 30 credit hours of research and a doctorate dissertation. The courses are selected in consultation with the PhD supervisor, from the list of graduate courses.

The completion of coursework is followed by a comprehensive examination for granting PhD candidacy. The PhD dissertation is evaluated by three experts: one Pakistani and two from technologically advanced countries. Subsequent to positive evaluation from these experts, the PhD scholar is required to undertake an open defense to fulfill the degree requirements.

A minimum residency of two years at the University campus and publishing at least one research paper in an impact factor journal of good repute is also an essential requirement to earn a PhD degree.



List of MS/PhD Courses

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| EE-811 | Advanced Digital Signal Processing | 3-0 |
| EE-812 | Digital Image Processing | 3-0 |
| EE-813 | Real-Time DSP Design & Applications | 3-0 |
| EE-814 | GIS and Remote Sensing | 3-0 |
| CS-829 | Advanced Computer Vision | 3-0 |
| EE-817 | Statistical Signal Processing | 3-0 |
| EE-818 | Adaptive Signal Processing | 3-0 |
| EE-819 | Array Signal Processing | 3-0 |
| EE-820 | Advanced Computer Architecture | 3-0 |
| EE-821 | Stochastic Systems | 3-0 |
| EE-822 | Information Coding & Theory | 3-0 |
| EE-823 | Advanced Digital Communication | 3-0 |
| EE-824 | Secure Communication | 3-0 |
| EE-825 | Fuzzy Control Systems | 3-0 |
| EE-826 | Telecommunication & Switching Principles | 3-0 |
| EE-827 | Optical Fiber Communication | 3-0 |
| EE-828 | Smart Antennas | 3-0 |
| EE-831 | Advanced Linear Control Systems | 3-0 |
| EE-832 | Nonlinear Control Systems | 3-0 |
| CS-811 | Advanced Computer Networks | 3-0 |
| EE-838 | Modern Electrical Drives | 3-0 |
| EE-847 | Advanced topics in Image and Video Processing | 3-0 |
| EE-849 | Special topics in Wireless Communications | 3-0 |
| EC-802 | Advanced Digital Systems Design | 3-0 |

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| EE-844 | Research Methodologies | 3-0 |
| EE-851 | RF Transmission and Antenna Design | 3-0 |
| EE-852 | Advanced Engineering Electromagnetics | 3-0 |
| EE-853 | Nanomaterials Engineering Applications | 3-0 |
| EE-854 | Network Optimization | 3-0 |
| EE-855 | Power System Transients | 3-0 |
| EE-856 | Satellite Communication | 3-0 |
| EE-857 | Advanced Power Electronics | 3-0 |
| EE-858 | High Voltage Engineering | 3-0 |
| EE-859 | Optimization Techniques in Power System | 3-0 |
| EE-860 | Power System Operation | 3-0 |
| EE-861 | Electrical Power Distribution Systems | 3-0 |
| EE-862 | Reliability Analysis for Power Systems | 3-0 |
| EE-863 | Advanced Topics in Antenna Design | 3-0 |
| EE-866 | Semiconductor Physics and Devices | 3-0 |
| EE-867 | Microwave Network Analysis and Passive Components | 3-0 |
| EE-868 | Electrical Machine Design | 3-0 |
| EE-869 | Advance Power System Protection | 3-0 |
| EE-870 | Wind Energy and Distributed Generation | 3-0 |
| EE-872 | Advanced Power System Stability & Control | 3-0 |
| EE-873 | Dielectric and Electrical Insulation Materials | 3-0 |

Research Groups, Technology Development and Incubation Centre

Following research groups are actively working in the Department:

Signal Processing & Communication Systems (SPCS) Research Group

The prime objective of Signal Processing & Communication Systems (SPCS) Research Group is to formulate and implement innovative mathematical and statistical theories related to Signal Processing and Communication Systems. The major research areas of this group include Signal Processing, Secure Communication, RF and Microwave Circuits Analysis, Image Processing and Computer Vision, Wireless Communication, Tracking, and Encryption Techniques.

Power & Control Systems (PCS) Research Group

Multidisciplinary research in Power and Control Systems establishes a constant attention on challenges being faced in this area, at national level. The core aim of the group is to conduct research in the areas of Power System and Control Theory, Applications of Control Systems, Analysis and Design of Future Power Generation and Control System, Power Transmission and Distribution, Adaptive and Robust Control, Renewable Energy Sources, Optical Network Capacity and Control, Optical Routing and Signal Processing, Industrial Control and Automation.

Technology Development & Incubation Centre

HITEC University has embarked upon an ambitious plan to fund start-up companies and provide an eco-system to make these start-ups sustainable business entities. To realize this vision, the Technology Development and Incubation Centre (TDIC) has recently been established in the Department of Electrical Engineering with the aim to provide an infrastructure to faculty members and students



to initiate their start-up venture or work on technologies that could be shaped to make tangible products.

Currently, TDIC provides resources such as office space, Internet, financial incentives, and assistance in setting up a business. TDIC also provides mentoring, training and technical support to help faculty and students accelerate their thought process; thus enables them to come up with market-driven products. The graduates are expected to play an important role in providing cost-effective solutions to technological challenges faced by our country; and accordingly, strengthening the national economy and improving employment opportunities.

Department of Mechanical Engineering



Dr. Liaqat Ali
Chairman

The present day development on the face of the earth owes a lot to mechanical engineering. It will be appropriate to call it the mother of all engineering disciplines. Its role and importance stands out as an undeniable fact worldwide. The knowledge, creativity and analytical tools provided by the various disciplines of mechanical engineering enable the students bring about positive and useful transitions and innovations. The borders of the realm to mechanical engineering outreach disciplines like aerospace engineering, Civil Engineering, electrical engineering, petroleum engineering, mechatronics and chemical engineering, which makes its importance very vital. A mechanical engineer utilizes core engineering principles augmented by computer aided engineering tools and product lifecycle management for designing and analyzing manufacturing plants, industrial equipment and machinery, heating and cooling systems, transport systems, aircrafts, watercrafts, robotics, medical devices and much more. It will not be unjust to say that mechanical engineers bring betterment and ease in the lives of people in every society.

The BS, MS and PhD programs of the department are duly accredited by the Pakistan Engineering Council (PEC) and the Higher Education Commission (HEC). The world renowned Outcome Based Education (OBE) system under the Washington Accord is followed in the department. This

helps us implement and follow international standards in the teaching learning and evaluating process, which in turn is very helpful for students when it comes to furthering their higher educational pursuits abroad. The department also firmly believes in academia-industry linkages, which further strengthens learning of our students. They get practical learning and research opportunities like this, so industrial visits are an integral and vital feature at the department of mechanical engineering.

We actively involve our students in research fields like production and manufacturing, machine fabrication, machine component designing, human powered vehicles, thermo fluids, structures and materials, renewable energy resources, material characterization and optimization, solar system manufacturing and so on. The department houses 12 well equipped laboratories for carrying out experimentations by students in the various fields of mechanical engineering. We are really grateful to Heavy Industries Taxila (HIT) for extending their patronage to our students to conduct various supervised projects, by offering their facilities. We believe that it is the environment, conducive to learning that helps a student, nurture creativity and entrepreneurial leadership through abroad based education. Hence, a special emphasis is laid on developing skills such as having an analytical bent of mind, logical reasoning, problem solving approach and other soft skills to perform in teams effectively, in different working environments. Similarly, students cultivate a solid background in fluid mechanics, material science, design, heat transfer, dynamics, thermodynamics and manufacturing for application within an industrial context.

It will be unjust, not to mention the highly qualified, self-motivated and experienced faculty of the department of mechanical engineering. They are the real strength of the department and make it all happen efficiently. The faculty, along with imparting quality education also remains involved in research activities and supervision of the students in their projects and extra-curricular pursuits. They work as active and efficient team members, who with their professional competence discharge their duties diligently to further the objective of imparting quality education.

Faculty

Dr. S. Kamran Afaq (HEC Approved Supervisor)

Designation: Professor / Dean Faculty of Engineering & Technology
Qualification: PhD University Paul Sabatier, Toulouse III, France
Area of Interest: Composite Material Structures (Design & Testing), Heat Transfer, Finite Element Analysis
Contact: kamran.afaq@hitecuni.edu.pk

Dr. Liaqat Ali (HEC Approved Supervisor)

Designation: Professor & Chairman
Qualification: PhD, Loughborough University, Leicestershire, UK
Area of interest: Workshop Technology, Manufacturing Processes, CAD/CAM
Contact: Liaqat.ali@hitecuni.edu.pk

Dr. Fahad Sarfraz Butt (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD University of Manchester, UK
Area of interest: Computational Fluid Dynamics
Contact: fahad.butt@hitecuni.edu.pk

Dr. Abdul Waheed Badar (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD Technical University of Berlin, Germany
Area of Interest: Solar Thermal Systems, Refrigeration and Air-Conditioning, Heat Transfer
Contact: abdul.waheed@hitecuni.edu.pk

Dr. Muhammad Farhan Ausaf

Designation: Assistant Professor
Qualification: PhD Huazhong University of Science & Technology, China
Area of interest: Optimization, Process Planning & Scheduling and Advance Heuristic Algorithms
Contact: farhan.ausaf@hitecuni.edu.pk

Dr. Atta Ur Rehman Shah (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD Mechanical Engineering, Changwon National University, South Korea
Area of interest: Composite Materials, Natural Fiber Composites, Polymer Composites, Mechanics of Materials, Fracture Mechanics, Finite Element Analysis
Contact: atta.shah@hitecuni.edu.pk

Dr. Muhammad Zahid Iqbal Qureshi (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD City University of Hong Kong, SAR China
Area of Interest: Computational Wind Engineering, Bluff body aerodynamics, Thermo fluids
Contact: zahid.iqbal.med@hitecuni.edu.pk

Dr. Tanveer Ahmed

Designation: Assistant Professor
Qualification: PhD Composite Materials, NUST, Islamabad
Area of Interest: Composite Materials, Manufacturing Management, Renewable Energy Systems
Contact: tanveer.ahmed@hitecuni.edu.pk

Dr. Syed Maaz Hasan

Designation: Assistant Professor
Qualification: PhD Mechanical Engineering, NUST, Islamabad.
Area of interest: Design, Modeling and Simulation, Manufacturing
Contact: syed.maaz@hitecuni.edu.pk

Dr. Luqman Ahmad Nizam

Designation: Assistant Professor
Qualification: PhD Mechanical Engineering, UET, Taxila.
Area of interest: Vibrations, Structural Design of Heat Exchanges, Condition Monitoring
Contact: luqman.ahmad@hitecuni.edu.pk

Syed Adeel Akhtar Shah

Designation: Assistant Professor
Qualification: MA English Literature, University of Peshawar, MBA (Marketing), Preston University Islamabad
LLB, University of Peshawar
Area of Interest: Creative Writing, Report Writing, Communication Skills
Contact: adeel.akhtar@hitecuni.edu.pk

Ms. Huma Fawad

Designation: Assistant Professor
Qualification: MS Engineering Management, UET Taxila. PhD (In Progress)
Area of Interest: Engineering Management, Environment
Contact: dsa@hitecuni.edu.pk

Mr. Athar Hameed

Designation: Assistant Professor
Qualification: MSc Mechanical Engineering, UET, Taxila. PhD (In Progress)
Area of interest: Applied Mechanics and Design, Theory of Machines & Mechanisms, Materials Engineering
Contact: athar.hameed@hitecuni.edu.pk

Mr. Abdul Aleem

Designation: Assistant Professor
Qualification: MSc (Industrial and Manufacturing Engineering), UET, Taxila
Area of interest: Project Management, Quality Assurance/ Quality Control, Industry Academia Linkage.
Contact: abdul.aleem@hitecuni.edu.pk

Mr. Saad Arif

Designation: Assistant Professor
Qualification: MS Mechatronics Engineering, NUST Islamabad. PhD (In progress)
Area of interest: Mobile Manipulation Systems, Brain Computer Interfaces, Machine Learning & Computer Vision
Contact: saad.arif@hitecuni.edu.pk

Mr. Zarak Khan

Designation: Assistant Professor
Qualification: MS Design & Manufacturing Engineering, NUST, Islamabad. PhD (In Progress)
Area of Interest: Additive Manufacturing, CAD/ CAM, SMART Materials
Contact: zarak.khan@hitecuni.edu.pk

Ms. Hadia Khan

Designation: Lecturer
Qualification: M Phil. English Literature, NUML. PhD (in Progress)
Area of Interest: English Language & Literature
Contact: hadia.khan@hitecuni.edu.pk

Mr. Moeen Mahboob

Designation: Lecturer
Qualification: MS Mechatronics Engineering, NUST, Islamabad.
Area of Interest: Robotics, Instrumentation, Control systems & Prosthesis
Contact: moeen.mahboob@hitecuni.edu.pk

Mr. Imran Sajid Shahid Ghumman

Designation: Lecturer
Qualification: MS Mechanical Engineering, HITEC University, Taxila. PhD (In Progress)
Area of Interest: Composites Materials, Reverse Engineering, Tribology, IC Engines
Contact: imran.sajid@hitecuni.edu.pk

Mr. Anique Mukhtar

Designation: Lecturer
Qualification: MS Mechanical Engineering, HITEC University, Taxila
Area of interest: Heat Transfer, Fracture Mechanics, Solid Mechanics
Contact: anique.mukhtar@hitecuni.edu.pk

Mr. Muhammad Younas

Designation: Lecturer
Qualification: MS Mechanical Engineering, NUST, Islamabad. PhD (In Progress)
Area of interest: Additive Manufacturing, Micro-fluids, Manufacturing Processes
Contact: muhammad.younas@hitecuni.edu.pk

Mr. Ayaz Mahmood Khan

Designation: Lecturer
Qualification: MSc Mechanical Engineering, NUST, Islamabad. PhD (In Progress)
Area of interest: Design and Stress Analysis, Engineering Failure Analysis, Vibration Analysis.
Contact: ayaz.mahmood@hitecuni.edu.pk

Mr. Syed Sajid Raza Zaidi

Designation: Lecturer
Qualification: MS Design & Manufacturing Engineering, NUST. PhD (In Progress)
Area of interest: I.C. Engines, Design & Manufacturing, Laser Material Processing
Contact: sajid.raza@hitecuni.edu.pk

Mr. Yasir Hamid

Designation: Lecturer
Qualification: MS Mechanical Engineering, HITEC University, Taxila. PhD (In Progress)
Area of interest: Tribology, CFD, Newtonian & Non-Newtonian Fluids, Heat Transfer
Contact: yasir.hamid@hitecuni.edu.pk

Mr. Sardar Shahbaz Ali Naqvi

Designation: Lecturer
Qualification: MS Design & Manufacturing, NUST, Islamabad.
Area of interest: Advanced Manufacturing, Lean Six Sigma, Supply Chain Management, Clean Coal Technology, Design of Machine
Contact: shahbaz.ali@hitecuni.edu.pk

Mr. Muhammad Mahad Shah

Designation: Lecturer
Qualification: MS Mechanical Engineering, NUST, Islamabad. PhD (In Progress)
Area of interest: Engineering Mechanics, Applied Physics (Statics) and I.C. Engines, Turbulent Flows & Auto Motives
Contact: mahad@hitecuni.edu.pk

Mr. Hafiz Ahmed Younas

Designation: Lecturer
Qualification: MS Mechanical Engineering, GIK Institute of Engineering Sciences and Technology, Topi
Area of interest: Design and Manufacturing, Fluid Mechanics, Theory of Machines.
Contact: hafiz.ahmed@hitecuni.edu.pk

Mr. Shahzad Yousaf

Designation: Lecturer
Qualification: MS Mechanical Engineering, NUST, Islamabad
Area of interest: Thermodynamics, Heat & Mass Transfer, Computational Fluid Dynamics.
Contact: shahzad.yousaf@hitecuni.edu.pk

Mr. Ammar Akram

Designation: Lecturer
Qualification: MS Mechanical Engineering, UET Taxila.
Area of Interest: Thermal System Engineering, Vibrations.
Contact: ammar.akram@hitecuni.edu.pk

Mr. Ahmed Zaheer

Designation: Lecturer
Qualification: MS Mechanical Engineering, University of Leicester, UK
Area of Interest: Energy Systems Engineering, Fluid Dynamics, Finite Element Analysis, Engineering Materials.
Contact: ahmed.zaheer@hitecuni.edu.pk

Mr. Bilal Haider

Designation: Lecturer
Qualification: MS Mechanical Engineering, Mechanical Engineering, UET Taxila
Area of interest: Design of Machine Elements, Heat & Mass Transfer.
Contact: bilal.haider@hitecuni.edu.pk

Mr. RizwanUllah

Designation: Lecturer
Qualification: MS Mechanical Engineering, GIK Institute of Engineering Sciences and Technology
Area of interest: Thermo-Fluids, Renewable Energy, AeroDynamics.
Contact: rizwan.ullah@hitecuni.edu.pk

Ms. Munaza Haq

Designation: Jr. Lecturer
Qualification: MS Mechanical Engineering, UET Taxila
Area of interest: Energy Engineering, Heat and Mass Transfer, Fluid Mechanics
Contact: munaza@hitecuni.edu.pk

Ms. Atiya Sadiq

Designation: Jr. Lecturer
Qualification: BSc Mechanical Engineering, UET, Taxila. MS (In Progress)
Area of interest: Thermodynamics, Heat & Mass Transfer
Contact: atiya.sadiq@hitecuni.edu.pk

Mr. Sardar Muhammad Aneeq Khan

Designation: Lab Engineer
Qualification: BS Mechanical Engineering, HITEC University, Taxila. MS (in progress)
Area of Interest: Heat Transfer, Solar Thermal Systems
Contact: aneeq.khan@hitecuni.edu.pk

Mr. Muneeb-ur-Rehman

Designation: Lab Engineer
Qualification: BS Mechanical Engineering, HITEC University, Taxila
Area of Interest: Mechanics of Materials , Theory of Machines
Contact: muneeb-ur-rehman@hitecuni.edu.pk

Mr. Muhammad Kashif

Designation: Lab Engineer
Qualification: BS Mechanical Engineering, IIUI, Islamabad
Area of Interest: Thermal Systems, Power Plant, I C Engines
Contact: muhammad.kashif@hitecuni.edu.pk

Mr. Muhammad Faraz Hussain

Designation: Academic Coordinator
Qualification: BS IT (Hons), Islamia University of Bahawalpur
Contact: coordinatormed@hitecuni.edu.pk



BS Mechanical Engineering

“Education is the foundation upon which we build our future.”

Christine Gregorie

The BS Mechanical Engineering program is duly accredited by the Pakistan Engineering Council (PEC) and hence it is in line with the guidelines and requirements of both the PEC and the HEC Higher Education Commission of Pakistan. This academic degree is awarded to students after successful completion of their four years study, spanning over eight semesters.

Some of the most important fields in which students broaden their knowledge, during this four year program are; statics, dynamics, control systems, vibrations, theory of machines, mechanics of materials, heat transfer, IC engines, fluid mechanics, thermodynamics, manufacturing processes and design of machine elements.

In order to extend the cognitive and affective domains of learning and to make it more practical by fulfilling the requirements of the psychomotor domain, students are provided with experimenting opportunities in the 14 well equipped laboratories for various engineering disciplines. These labs are well furnished and equipped with latest equipment to help students learn in a befitting manner. Moreover, software applications like CAD/CAM, CAE, CNC, ANSYS and MATLAB also augment the lab usage. This lays emphasis on practical aspect of learning and shapes the phenomenon in tangible terms, right according to the requirements of the Washington Accord, under OBE Outcome Based Education.

Curriculum

Semester-1

| Course Code | Course Title | Credit Hours |
|---------------------------|--------------------------------|--------------|
| MT-101 | Calculus and Analytic Geometry | 3 + 0 |
| BS-102 | Engineering Chemistry | 2 + 0 |
| BS-103 | Applied Engineering Physics | 2 + 0 |
| EC-110 | Computing Fundamentals | 2 + 1 |
| HS-101 | English | 3 + 0 |
| HS-102 | Pakistan Studies | 2 + 0 |
| ME-101 | Workshop Technology | 0 + 2 |
| Total Credit Hours | | 17 |

Semester-2

| Course Code | Course Title | Credit Hours |
|---------------------------|---|--------------|
| MT-303 | Applied Linear Algebra | 2 + 0 |
| EE-220 | Fundamental of Electrical Engineering | 3 + 0 |
| IS-211 | Islamic Studies | 2 + 0 |
| HS-103 | Communication Skills | 3 + 0 |
| ME-104 | Engineering Drawing & Graphics | 0 + 2 |
| ME-105 | Engineering Statics | 3 + 0 |
| ME-202 | Material Science & Engineering | 2 + 0 |
| EE-220L | Fundamental of Electrical Engineering Lab | 0 + 1 |
| Total Credit Hours | | 18 |

Semester-3

| Course Code | Course Title | Credit Hours |
|---------------------------|--------------------------------|--------------|
| MT-201 | Complex Variables & Transforms | 3 + 0 |
| ME-102 | Thermodynamics-I | 3 + 0 |
| ME-103 | Fluid Mechanics-I | 3 + 0 |
| ME-201 | Engineering Dynamics | 3 + 0 |
| ME-205 | Mechanics of Material-I | 3 + 0 |
| ME-201L | Engineering Mechanics Lab | 0 + 1 |
| ME-303 | Manufacturing Process | 2 + 0 |
| Total Credit Hours | | 18 |

Semester-4

| Course Code | Course Title | Credit Hours |
|---------------------------|---------------------------|---------------|
| MT-103 | Differential Equations | 3 + 0 |
| HS-201 | Technical Report Writing | 3 + 0 |
| ME-203 | Fluid Mechanics-II | 3 + 0 |
| ME-204 | Thermodynamics-II | 3 + 0 |
| ME-301 | Mechanics of Material-II | 3 + 0 |
| ME-203L | Fluid Mechanics Lab | 0 + 1 |
| ME-204L | Thermodynamics Lab | 0 + 1 |
| ME-205L | Mechanics of Material Lab | 0 + 1 |
| HS-203 | Community Service | 0 + 1 (NC) |
| Total Credit Hours | | 18 |

Semester-5

| Course Code | Course Title | Credit Hours |
|---------------------------|-------------------------------------|--------------|
| MT-202 | Numerical Methods | 2 + 1 |
| ME-206 | Heat & Mass Transfer | 3 + 0 |
| ME-302 | Theory of Machines | 3 + 0 |
| ME-304 | Design of Machine Elements-I | 3 + 0 |
| ME-307 | Mechanical Vibrations | 3 + 0 |
| ME-307L | Theory of Machines / Vibrations Lab | 0 + 1 |
| ME-308L | Design of Machine Elements Lab | 0 + 1 |
| Total Credit Hours | | 17 |

Semester-6

| Course Code | Course Title | Credit Hours |
|---------------------------|-----------------------------------|--------------|
| MT-302 | Probability & Statistics | 3 + 0 |
| EE-320 | Analog and Digital Systems | 3 + 0 |
| HS-401 | Professional Values and Ethics | 2 + 0 |
| ME-305 | Refrigeration & Air Conditioning | 3 + 0 |
| ME-308 | Design of Machine Elements -II | 3 + 0 |
| ME-405 | Instrumentation & Measurement | 2 + 0 |
| ME-305L | Heat Transfer & Refrigeration Lab | 0 + 1 |
| EE-320L | Analog and Digital Systems Lab | 0 + 1 |
| Total Credit Hours | | 18 |

Semester-7

| Course Code | Course Title | Credit Hours |
|---------------------------|---------------------------------------|--------------|
| HS-402 | Economics | 2 + 0 |
| ME-306 | I.C Engines | 3 + 0 |
| ME-401 | Design Project-I | 0 + 3 |
| ME-403 | Control Systems | 3 + 0 |
| ME-404 | CAD/CAM | 2 + 0 |
| ME-306L | I.C Engines Lab | 0 + 1 |
| ME-403L | Instrumentation & Control Systems Lab | 0 + 1 |
| ME-405L | CAD/CAM Lab | 0 + 1 |
| Total Credit Hours | | 16 |

Semester-8

| Course Code | Course Title | Credit Hours |
|---------------------------|-------------------------------|--------------|
| HS-403 | Management & Entrepreneurship | 3 + 0 |
| ME-401 | Design Project-II | 0 + 3 |
| ME-4XX | Elective-I | 3 + 0 |
| ME-4XX | Elective-II | 3 + 0 |
| ME-407 | Health Safety and Environment | 1 + 0 |
| HS-404 | Foreign Language | 1 + 1 |
| Total Credit Hours | | 15 |



List of Elective Courses

| Course Code | Course Title | Credit Hours |
|-------------|--------------------------------------|--------------|
| ME-402 | Power Plant | 3 + 0 |
| ME-410 | Gas Dynamics | 3 + 0 |
| ME-411 | Computational Fluid Dynamics | 3 + 0 |
| ME-412 | Industrial Engineering | 3 + 0 |
| ME-413 | Finite Element Analysis | 3 + 0 |
| ME-415 | Optimization | 3 + 0 |
| ME-416 | Renewable Energy Resources | 3 + 0 |
| ME-418 | Tribology | 3 + 0 |
| ME-421 | Advanced Manufacturing Techniques | 3 + 0 |
| ME-422 | Advanced Stress Analysis | 3 + 0 |
| ME-423 | Experimental Stress Analysis | 3 + 0 |
| ME-425 | Engineering Entrepreneurship | 3 + 0 |
| ME-426 | Mathematical Modeling and Simulation | 3 + 0 |
| ME-427 | Robotics | 3 + 0 |



Course Contents

BS-103: Applied Engineering Physics

Introduction to units and their inter-conversion, dimensionless quantities, vectors, centroids, areas, volumes, moments of inertia, simple harmonic motion, waves and oscillations, electricity and magnetism, waves and acoustics, introduction to industrial electronics, use of polarized light in instruments, magnetism and electromagnetism, nuclear reaction, solid state physics, crystals and non-crystals.

BS-102: Engineering Chemistry

Thermochemistry, electrochemistry, laws of electrolysis, organic chemistry, production and uses of hydrocarbons, production and uses of minerals, extraction of metals and their properties, corrosion, cement industry, production of cement and its testing, production and uses of rubber, polymers and elastomers, coolants and their uses, production of rocket fuel/propellant and types of propellants, type of alloys and their uses, pollution and environmental chemistry.

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 149.

MT-103: Differential Equations

For contents, please refer to page number 149.

EC-110: Computing Fundamentals

For contents, please refer to page number 77.

ME-101: Workshop Technology

Introduction to various mechanical workshops and their safety instructions, introduction to various measurement tools, soldering, brazing and welding, welding types, welding methods and processes, introduction to machine tools, basic lathe operations, basic processes in metal shop, forging tools and accessories, drilling machines and their types, milling machines and their types, milling processes, indexing, shaper machines and their processes.

ME-102: Thermodynamics - I

Introduction and basic concepts, Zeroth law of thermodynamics, Energy, Energy transfer, First law of thermodynamics, Properties of a pure substances, Evaluating properties and property diagrams, Energy Analysis of closed systems, Energy analysis of control volumes, The Second Law of Thermodynamics, Entropy, Introduction to thermodynamic gas power cycles.

ME-103: Fluid Mechanics - I

Introduction to fluid mechanics, definition of fluids, concept of fluid continuum, dimensions and units, thermodynamic properties, viscosity and secondary properties, flow patterns, pressure and pressure gradient, hydrostatic pressure distribution, manometry, hydrostatic forces on inclined and curved submerged surfaces, buoyancy and stability, pressure measurements, integral relations for control volume, transport theorem, integral conservation of mass, momentum and energy, bernoulli equation, steady flow energy equation, differential relations for fluid flow, material derivative, continuity equation, euler equation, Navier-Stokes equations, differential energy equation, boundary conditions, stream functions, vorticity, potential flow, dimensional analysis and similarity, Pi theorem, modelling and similarity.

ME-104: Engineering Drawing and Graphics

Introduction, dimensioning, sheet planning, use of drawing instruments, orthographic projection, engineering geometry, fits and tolerances, geometrical dimensioning and tolerances, practice of using different drawing tools e.g. pencil, scribe, T-square etc., attachment of drawing sheet on board and division of sheet. drawing of a cycloid, epicycloids, hypocycloid and involutes to a given circle, drawing the views of 3-D models using the concepts of 1st and 3rd angle projections, introduction to auto-CAD, basic commands and functions, drawing view in 1st and 3rd angle projections, introduction to 3-D modeling.

ME-105: Engineering Statics

Introduction to statics, force systems, equilibrium,

structures, distributed forces, friction, difference between kinematics and kinetics, trusses.

ME-106: Introduction to Engineering

Introduction to engineering, difference between engineering, science and technology, disciplines of engineering, engineering design, Interdisciplinary engineering (science, technology and society), global engineering and the future (renewable energy), problem solving techniques in engineering, visualization and graphics, analytical tools for engineers including MATLAB, ANSYS, Hap, GT Power, TRANSYS and others, professional ethics and engineering management, engineering fundamentals (statics, dynamics, thermodynamics, circuitry, economics), future challenges (magnesium alloys, energy storage systems, big data, bio sensing and bio actuations and others)

ME-201: Engineering Dynamics

Difference between Kinetics and Kinematics problem Identification of direct approach for solution of dynamics problem, Solution of both linear and rotational Kinematics problem, Solution of Kinematics problem by combining Newton's law and Kinematics equation, Solution of Kinetics problem using the principle of work and energy, Solution of Kinetics problem using the principle of impulse and momentum, Identification and solution of Kinetics problem for which energy or momentum is conserved.

MT-201: Complex Variables and Transforms

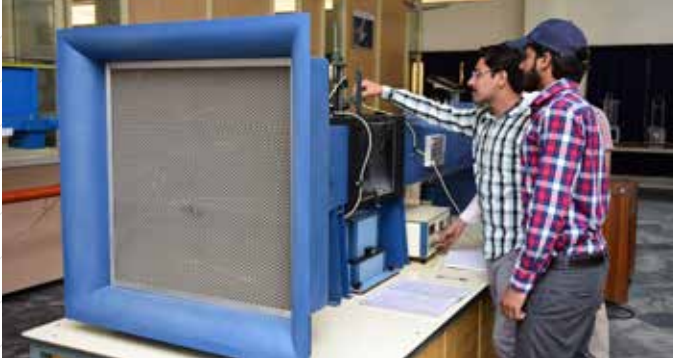
For contents, please refer to page number 149.

MT-202: Numerical Methods

For contents, please refer to page number 149.

ME-202: Material Science and Engineering

Imperfections in solids, diffusion, mechanical properties of metals, dislocations mechanisms, failure, phase diagrams, development of microstructure and alteration of mechanical properties, applications and processing of metal alloys, ceramics, polymer structures, composites, corrosion and degradation of materials, electrical properties, thermal properties, magnetic properties, optical properties, materials selection and design considerations,



smart materials and structures.

HS-203: Community Service.

For contents, please refer to page number 25.

ME-203: Fluid Mechanics - II

Viscous flow in ducts, Reynolds number, entrance length, Darcy-Weisbach equation, friction factor, moody diagram, Colebrook formula, four types of pipe-flow problems, non-circular ducts, minor losses, pipe systems, boundary Layer flows, displacement thickness, momentum thickness, drag on immersed bodies, lift on immersed bodies, airfoil theory, flow in open channels, uniform channels, efficient uniform channels, specific energy, critical depth, hydraulic jump, gradually-varied flow, flow control using weirs, flow measurement, gravity currents, turbo-machinery classification, types of pumps, centrifugal pump, pump performance, performance curves, mixed pumps, system characteristics, specific speed, turbines.

ME-204: Thermodynamics - II

Gas turbine cycle, the Brayton cycle with inter-cooling, reheating and regeneration, the Rankine cycle, energy analysis of the Ideal and actual Rankine, combined gas-vapor power cycles, nozzles and diffusers, critical pressure ratio, maximum mass flow condition, nozzles pressure ratio design, nozzle efficiency, super-saturation, the impulse steam turbine, pressure and velocity compounded impulse steam turbines, axial-flow reaction turbines, losses in turbines, stage efficiency and reheat factor, Introduction, the structure of crystalline solids, reciprocating compressors,

multistage compression, rotary compressors.

ME-205: Mechanics of Materials - I

Concept of stresses, axial loading, normal stresses, shearing stresses, stress strain diagram, Poisson's ratio, thermal stresses, elasto-plastic behavior, torsion and bending moments, stresses in torsion and bending, angle of twist in the elastic range, beam under pure bending, residual stresses, analysis and design of beams for bending, shear force and bending moment diagrams, Mohr's circle for two-dimensional loading, deflection of beams.

ME-206: Heat and Mass Transfer

Concept of heat flow, conduction, convection and radiation heat transfer, free and forced convection, heat transfer from extended surfaces, mass transfer, Fick's law, analogy between heat and mass transfer, the overall heat transfer co-efficient, log mean temperature difference, heat exchanger types, the effective NTU relations.

ME-211: Computer Aided Engineering Drawing

Drawing basics, various views of a three dimensional object and their importance, AUTOCAD basics starting to draw, drawing in two dimensions and sketching, working with data, drawing in three dimensions, basics of 3D-drawing, drawing isometric view and section, plan and elevation views of various electrical and electronic devices in AUTOCAD, solid projection modeling, projects.

IS-211: Islamic Studies

For contents, please refer to page number 172.

EE-220: Fundamentals of Electrical Engineering

For contents, please refer to page number 26.

ME-301: Mechanics of Materials - II

Equation of elastic curve for beams, statically indeterminate beams, singularity function to determine the slope and deflection of beam, method of superposition, moment-area theorems, impact loading, stresses in thin-walled

pressure vessels, transformations of stresses and strains, Mohr's circle for two and three dimensional stresses, general state of stress, theories of failure, fatigue failures, measurements of strain, strain rosette.

MT-302: Probability and Statistics

For contents, please refer to page number 150.

ME-302: Theory of Machines

Linkages synthesis and analysis, position, velocity and acceleration analysis, turning moment diagram, flywheels, valve diagrams, static and dynamic balancing, worm and worm gear analysis, cam designing, belts and rope drives, chains and sprockets, brakes, governors, effort and power, sensitivity, gyroscope, geometry of gears.

ME-303: Manufacturing Processes

Introduction to manufacturing technology, plastic deformation, metal forming processes: forging, rolling, extrusion, drawing, sheet metal forming, casting manufacturing of ceramics, glass and plastics, complex manufacturing processes and core technologies, advanced manufacturing process design, raw materials and energy requirements of manufacturing processes.

ME-304: Design of Machine Elements - I

Basic criteria of the performance and design of machine parts, determination of permissible and actual stresses, design of simple element, design of keys and couplings, design of welded, riveted, and bolted joints, design of helical springs and leaf springs, design of shafts, design standard (ISO, ASME, ANSI, ASTM etc), metal fit and tolerances

ME-305: Refrigeration and Air-Conditioning

Introduction to basic principles of refrigeration and air conditioning systems, Reverse Carnot Cycle, Co-efficient of Performance, working principle and basic components of vapor compression cycle classification of refrigerants, their properties and the negative effects of banned refrigerants on humans and the environment, Function and operation of the basic components of vapor absorption as well as adsorption systems, Psychrometric analysis of various air conditioning systems, application of CIBS/ CLTD Method for calculation of cooling and heating loads as applied to air conditioning systems and estimating cooling requirement

for a given space.

ME-306: Internal Combustion Engines

Introduction to various types, and designs of Internal Combustion Engines, their basic working principles, classification and configurations and relative advantages/disadvantages of petrol/diesel and four stroke/two stroke engines, Engine design and operating parameters and efficiencies, mean effective pressure, various types of fuel injection systems including single point and multipoint gasoline injection systems for SI engines, supercharging technologies and comparison of turbochargers and mechanical compressors, Thermo-chemistry of fuel and air mixtures involving stoichiometric ratios, employment of dynamometers to calculate various kinds of engine performance given basic parameters, evaluation of different engines' performance and fuel economy and cognizance of the need to reduce pollution.

ME-307: Mechanical Vibrations

Oscillatory motion, equation of motion, viscously damped free vibration, logarithmic decrement, forced harmonic vibration, two degree of freedom system normal modes of vibration, vibration absorber, vibration damper, vibration of elastic bodies, critical speed of rotating shafts with single rotor and two rotors, vibration measurement, Holzer method, electrical and mechanical analogies.

ME-308: Design of Machine Elements - II

Design of spur, helical, bevel and worm gears, design



of fly wheel, design of brake/clutches, design of power screws/translation screws, design of belt and chain drive, selection of bearings.

EE-320: Analog and Digital Systems

For contents, please refer to page number 28.

ME-210: Engineering Mechanics

Fundamental concepts and principles of mechanics, force factors, resultants, equilibrium of rigid body, kinetics and kinematics of particles, relative motion, curvilinear motion, basic thermodynamics laws and cycles, processes and PV-diagrams, heat transfer modes and heat transfer through walls and circular pipes.

ME-403: Control Systems

Feedback concepts and its terminology, modeling of systems having translatory movements, modeling of rotary systems, modeling of thermal systems, review of Laplace transformation, derivation of transfer function, computing the output of a system for a given input, block diagram, signal flow graph, stability and its types, response of the first order systems, response of the second order systems, type of the second order systems, performance specifications of a typical second order systems, root locus techniques, introduction to AVR microcontroller and its components, AVR timer counter programming and PWM generation, ADC, DAC, sensors, relays, BJTs, MOSFETs, interfacing with AVR, DC servomotor interfacing and control with AVR timer/counter programming and PWM generation, ADC, DAC

ME-404: CAD/CAM

Computer in industrial manufacturing geometric modeling system, rapid prototyping, concurrent engineering, numerical control systems, automation, computer aided quality control, cellular manufacturing system, flexible manufacturing system, group technology and CAPP, implementation of a CAD/CAM system, computer integrated manufacturing.

ME-405: Instrumentation and Measurements

Introduction, sensor/transducer technologies and characteristics, temperature measurement system, flow and level measurement systems, displacement, velocity, and acceleration measurement both linear and rotational,

optical encoders and optical tachometer sensors, relays, BJTs, MOSFETs, interfacing with AVR, DC servomotor interfacing and control with AVR signal conditioning and data acquisition. Introduction to biomedical instrumentation.

ME- 407: Health Safety and Environment

The Health Safety and Environment course is specifically designed to provide environmental protection and safety at work. It involves generating organized procedures and efforts in order to identify different types of hazards. It aims to reduce accidents at workplaces. Students of engineering program will learn how to identify different types of hazards like ergonomic, thermal, chemical, electrical and radioactive hazards at workplaces, which can affect the health and safety of employees. Students will learn about the management of hazardous materials and wastes. This course will address specific threats, such as outdoor and indoor air pollution, toxic metals, pesticides and radiation. Emphasis will also be given to understanding the worsening environmental health impacts of industrialization on developing countries, the effects of globalization, such as the growing movement of hazardous industries, products, and wastes across borders and the rise of the environmental justice movement.

HS-101: English

For contents, please refer to page number 24.

HS-103: Communication Skills

For contents, please refer to page number 24.

HS-201: Technical Report Writing

For contents, please refer to page number 25.

HS-401: Professional Values & Ethics

For contents, please refer to page number 173.

HS-402: Economics

For contents, please refer to page number 28.

HS-403: Management & Entrepreneurship

For contents, please refer to page number 29.

HS-404: Foreign Language

For contents, please refer to page number 30.

Elective Courses

ME-402: Power Plants

Steam power plants, steam generators, engines and auxiliary components, losses in pipes, turbine, pump and condenser, gas turbine power plant, the practical gas turbine cycle, jet propulsion plant, aircraft jet engine, subsonic and supersonic propulsion, propellants and combustion, thrust chamber, nuclear power plant, nuclear reactions as energy sources, moderators and reflectors, nuclear hazards and safety practice.

ME-410: Gas Dynamics

Introduction, basic governing laws of conservation of mass, momentum and energy, sub-sonic and supersonic gas flow, isentropic flow, normal and oblique shocks, Rayleigh flow and Fanno flow, Prandtl-Meyer compression and expansion.

ME-411: Computational Fluid Dynamics

Introduction, partial differential equation, basics of finite difference methods, concepts of error, consistency and stability, momentum and energy equations, diffusion equations, turbulence modeling, boundary layer computational methods, hyperbolic equations, grid systems.

ME-412: Industrial Engineering

Production management and decision making, analytical and quantitative methods of management, planning organization and control of production systems, plant layout, work and method study.

ME-413: Finite Element Analysis

The stiffness method and the plane truss, integral formulations and variational methods, weak boundary value problem, Rayleigh–Ritz method, error analysis, Eigen value problem, two and three dimensional problems, plane elasticity, bending of plates, beams, use of commercial FEA codes, applications of FEA in the relevant fields of study.

ME-415: Optimization

Introduction to optimization with reference to engineering design, operation research and management problems, Kuh-Tucker conditions, linear programming applications for design, sensitivity analysis with application to engineering design, nonlinear design optimum problems and their solutions with numerical techniques, case studies with application of optimum techniques to machine components.

ME-416: Renewable Energy Resources

Introduction to renewable energy resources, energy mix of world, energy and environment, solar energy, solar thermal, solar PV, wind energy, wind turbine design specifications, geothermal energy, biomass energy, Kyoto protocol.

ME-418: Tribology

Tribology history and applications, theory of friction, contact mechanism, study of surfaces, roughness measurements, mechanism of wear and types of wear, lubricants and its properties, study of seals, its design and wear phenomenon, temperature distribution study on contacting surfaces, study of bearing and its types, tribology study in polymers and composites.

ME-421: Advanced Manufacturing Techniques

Principles of manufacturing, resources planning, operations management, forecasting techniques, production planning and scheduling procedures, analysis of manufacturing resources, material inventory activities, facilities and physical plant layout, production process and equipment, manufacturing automation, productivity, quality, team projects using computer modeling software.

ME-422: Advanced Stress Analysis

Elasticity field equations, methods of solution, 2D problems, plane stress and plane strain, axi-symmetric problems, thick-walled cylinders, rotating, discs, stress concentration around circular inclusions, 2D problems in



rectangular, coordinates, corrective solutions, end effect, self-similar problems, singularities, elastic indentation, introduction to plasticity: stress-strain, idealization, yield function, hardening rules, total and incremental models, residual stresses, Bauschinger effect, Autofrettage cyclic plasticity, normality rule, back, stress, movement of yield surface, numerical implementation of cyclic, plasticity.

ME-423: Experimental Stress Analysis

Stress optical law-polarized light, effect of stressed model in a plane polariscope, effect of stressed model in circular polariscope, isochromatic fringe patterns, isoclinic fringe patterns, materials for three-dimensional photo elasticity, resistance strain gauges, parameters influencing behavior of strain gauge, introduction to polariscope and basic experiments on polariscope.

ME-426: Mathematical Modeling and Simulation

Modeling multi-domain engineering systems for design and control system implementation, network representation, state-space models, multiport energy storage and dissipation, Legendre transforms, non-linear mechanics, transformation theory, Lagrangian and Hamiltonian forms, control-relevant properties. Application examples like electro-mechanical transducers, mechanisms, electronics, fluid and thermal systems, compressible flow, chemical processes, diffusion, and wave transmission.

ME-427: Robotics

Coordinate frames, homogeneous transformations, introduction to forward kinematics, inverse kinematics, dynamics, velocities, static forces, and Jacobians, trajectory planning, mechanical design of robots.

Laboratory Courses

Undergraduate Laboratories

Mechanical Engineering program at HITEC University is very well supported by laboratory work. Experimental work related to different subjects is carried out in our relevant teaching labs.

ME-101: Workshop Technology

Introduction to measuring tools like vernier caliper, micrometer screw gauge etc., machining of cylindrical job as per given drawing contains facing, turning, center drilling, taper turning, grooving, chamfering, outer and inner threading, boring, shaping of jobs as per given drawings which include, square, rectangular, hexagonal, key way shapes, introduction to electric arc welding, gas welding and gas cutting process, different types of flame, shaper machine, milling machine, drilling machine, power hacksaw.

ME-201L: Engineering Mechanics

Vectors and equilibrium of forces, spring compression apparatus, spring extension, moments, reactions of beams, toggle joint, center of gravity, statics and dynamics coefficient of friction, measurement of centrifugal force, governor, gear, rolling disc on inclined plane apparatus, rotational moment of inertia apparatus.

ME-205L: Mechanics of Materials

Hardness measurement (brinell and rockwell), determination of fatigue life and endurance limit (low load, high load), modulus of rigidity and maximum shear strength, load of spring under certain deformation, modulus of elasticity, elastic limit, yield point, tensile strength of different materials, flexural strength, strain measurement under tensile, torsion and bending load, impact testing of different material, creep testing.

ME-203L: Fluid Mechanics

Viscosity of liquids, gauge calibration, hydrostatic pressure, metacentric height, Bernoulli's theorem, impact of jet, flow through orifice, free and forced vortex, flow visualization, Osborne Reynolds's number, pipe friction apparatus, head loss in fluid friction, pelton turbine, reaction turbine, characteristics of pump in series and parallel configuration, losses in bends, low subsonic wind tunnel (external

flow investigation capability at low Reynolds numbers, 2 component force balance, pitot static tube).

ME-204L: Thermodynamics

Change in boiling point of a fluid at different pressures, study of boiling by increasing the flow rate of heated water, study of Diesel and Otto cycle during the two and four strokes, study of all components of turbo jet engine, study of Wankel engine, study the working and thermodynamics of steam engine and the thermodynamics of Rankine cycle and derivation of its efficiency as applicable to steam power plant.

ME-305L: Heat Transfer and Refrigeration

Thermal conductivity of different materials, linear and radial, interface temperature and thermal resistance concept, emittance of different plates, coefficient of heat transfer and efficiency in free and forced convection for flat plate, fins and pipe bundle, Nusselt number, Reynolds number, log mean temperature difference (LMTD), study and the flow rate effects on heat transfer for shell and tube, spiral, concentric and plate heat exchanger, cross flow heat exchanger, Stefan Boltzmann law of thermal radiation for black, grey and polished surfaces, experimental performance of the working of refrigeration and air-conditioning unit, light absorption unit, thermal conductivity of air and water.

ME-306L: I.C Engine

Calculation and measurement of torque speed, brake mean effective pressure, air and fuel consumption, volumetric and thermal efficiencies, indicated mean effective pressure and indicated power. The engine test which is capable to plot PV diagram and engine performance curves. Cut away model of four-stroke diesel and two-stroke petrol engine, cut-away models of fuel injection pump gear box and air/ fuel filter.

ME-307L: Theories of Machines and Vibrations

Application of Grash of condition on a slider-crank mechanism and study the variation in velocity and acceleration, slotted link slider-crank mechanism, static and dynamic balancing, gyroscopic effect at first, second

and third moments, working of gears, belt assembly, cardifferential and fly wheel. Natural frequency of the system (with and without damper), torsional stiffness and the natural frequency of the given bar. Compare theoretical natural frequency with values obtained by measurement. Forced oscillations and the phenomena of resonance.

ME-308L: Design of Machine Elements

Basics of programming in MATLAB, programming flow control in MATLAB, graphics in MATLAB, machine design examples in MATLAB. Introduction to ANSYS, basics of finite elements analysis, two dimensional trusses, plane stress brackets, solid modeling, effect of self-weight, cantilever beam with concentrated and distributed load, thermal analysis in ANSYS with different boundary conditions, design optimization using ANSYS, composite modeling, fluent (laminar and turbulent flow in pipe), mechanics and optimization.

ME-403L: Instrumentation and Control

Introduction to sensors and transducers, study of sensor behavior, properties and characteristics of strain gauges, linear and rotary potentiometers, LVDT, a variable-

area capacitor, optical encoders, opto-reflector, tachogenerators, reed switch, variable reluctance probe, thermocouples, RTDS and thermistors, pressure control sensors and transducers, characterization of PID and PID controllers in flow, level, pressure and temperature control processes, FMS (flexible manufacturing system) and its working, use of Arduino microcontroller to design mini lab projects.

ME-404L: CAD/CAM

Introduction to Pro E, extrusion, hole , round and chamfer fillet, shell, revolve, ribs , pattern, sweep, blend and engineering design, swept and blended features, helical sweep features, drawing layout, advanced mechanism, detailing, final assembly. Introduction to machining and CNC technology, coordinate systems and basic programming codes used in CNC milling/ lathe machines, introduction to rapid traverse, linear and circular interpolation, introduction to work coordinate offset, tool length and cutter radius compensation, write and execute the programming on CNC milling machine of given figures.



MS Mechanical Engineering

“An investment in knowledge pays the best interest.”

Benjamin Franklin

This program offers students with an opportunity of exploring more and to step into the world of higher studies, where they can open a new vista of learning for themselves in the various fields of mechanical engineering. Possession of a BS/BE degree in Mechanical Engineering, Mechatronics Engineering or Aerospace Engineering with a minimum CGPA 2 out of 4 is a must and a pre requisite for those desirous to take admission in the MS program. Moreover, candidates must also have passed the GAT university exam as per the prevailing requirements of the HEC.

A student can select from a list of offered courses in the semester, but it is advisable to choose a course which is suitable from the point of view of MS research project, which is assigned on the successful completion of coursework. Similarly, completion of 30 credit hours of graduate courses is compulsory and likewise completion of 6 credit hours of research thesis is also mandatory. There are excellent research resources available in the university and the faculty that teaches and supervises the MS program is mostly foreign qualified.



PhD Mechanical Engineering

“Education is the most powerful weapon which you can use to change the world.”

Nelson Mandela

The PhD program consists of minimum 18 credit hours of post graduate level course work and 30 credit hours of research thesis. This is the highest degree awarded by the department of Mechanical Engineering and it is highly recommended for those scholars, who aspire to further their careers in academia or research, both in public or private sector organizations.

PhD degree enables the scholars to carry out independent research in turn to be published in national and international journals of repute. Candidates desirous for admission in the PhD program must possess MS degree with a minimum CGPA 3 out of 4. Moreover, the candidate must also have passed the GAT subject exam as per the prevailing HEC requirements.

This program is designed to equip candidates with high level of scholarship, in the light of growing international trends and techniques, in the field of Mechanical Engineering. Therefore, the program is supervised by mostly foreign qualified and highly experienced faculty to cater for the needs of the scholars, to enhance their analytical skills and to enable them attain the required level of expertise in the selected area.

Scholars undergo a comprehensive examination after the completion of their course work. It is after this phase that the candidacy as a PhD researcher is granted. The performance and progress of the scholars; right from their selection, course work, research and thesis stages are monitored and evaluated by the Graduate Evaluation Committee GEC.

MS/PhD Courses

| Code | Course Title | Cr. Hr. |
|--------|--|---------|
| ME-811 | Finite Element Analysis | 3 + 0 |
| ME-812 | Advanced Material Science and Engineering | 3 + 0 |
| ME-813 | Advanced Solid Mechanics | 3 + 0 |
| ME-815 | Advanced Theory of Elasticity | 3 + 0 |
| ME-816 | Advanced Thermodynamics | 3 + 0 |
| ME-818 | Advanced Fluid Mechanics | 3 + 0 |
| ME-819 | Computational Fluid Dynamics | 3 + 0 |
| ME-820 | Experimental Stress Analysis | 3 + 0 |
| ME-823 | Manufacturing System | 3 + 0 |
| ME 824 | Advanced Robotics | 3 + 0 |
| ME-829 | Engineering Design and Optimization | 3 + 0 |
| ME-830 | Mechanics of Composite Materials | 3 + 0 |
| ME-831 | Fracture Mechanics | 3 + 0 |
| ME 832 | Advanced Dynamics | 3 + 0 |
| ME-835 | Theory of Plates and Shell | 3 + 0 |
| ME-837 | Radiation Heat Transfer | 3 + 0 |
| ME-838 | Advanced Heat Transfer | 3 + 0 |
| ME-839 | Theory of Turbo Machinery | 3 + 0 |
| MT-839 | Advanced Numerical Techniques | 3 + 0 |
| ME-840 | Gas Dynamics | 3 + 0 |
| ME-841 | Advanced Mechanical Behavior of Materials | 3 + 0 |
| ME-842 | Finite Element Analysis of Composite Materials | 3 + 0 |
| ME-843 | Advanced Refrigeration | 3 + 0 |
| ME-844 | Design of Thermal System | 3 + 0 |
| ME-860 | Solar Thermal Systems | 3 + 0 |
| ME-861 | Boundary layer Flows | 3 + 0 |
| ME-862 | Introduction to Turbulent Flows | 3 + 0 |
| ME-863 | Mechanics of Manufacturing Processes | 3 + 0 |
| ME-865 | Advanced Control Systems | 3 + 0 |
| ME-866 | Design for Manufacture and Assembly | 3 + 0 |
| ME-867 | Sustainable Renewable Energy Systems | 3 + 0 |
| ME-900 | Special Topics | 9 + 0 |

Student Chapters

ASME Student Chapter (American Society of Mechanical Engineers).

American Society of Mechanical Engineers is a professional association that, in its own words, “promotes the art, science, and practice of multidisciplinary engineering and allied sciences around the globe” via “continuing



education, training and professional development, codes and standards, research, conferences and publications, government relations, and other forms of outreach.” ASME Student Chapter was inaugurated in HITEC University in Sep. 2011, it is regularly conducting various events among the students such as tutorials and seminars, industrial tours, competitions and conferences etc. It is currently managing 180 members and has its own webpage: asmehitec.webs.com and official email: asme@hitecuni.edu.pk. Dr. S. Kamran Afaq is its advisor.

ASME HITEC student chapter arranged Human Power Vehicle Contest (HPVC) every year to explore the technical skills of students. ASME HITEC student chapter organized various technical and informational events every year since 2011 such as:

- Water rocket competition
- Avion faire competition
- Egg drop competition
- Glider design competition
- Methletics
- Industrial visits

SMEP Student Chapter (Society of Mechanical Engineers of Pakistan).

The Society of Mechanical Engineers of Pakistan aims at providing a platform to the Mechanical Engineers

to enhance their professional expertise, introduce standardization, improve quality of education, provide with growth opportunities etc. Student chapter of SMEP was inaugurated on 6th March 2013 with the intention to be one of the most active student societies.

ASHRAE Student Chapter (American Society of Heating Refrigerating Air conditioning).

ASHRAE the American Society of Heating, Refrigerating and Air Conditioning Engineers, founded in 1894, is a building technology society with more than 54,000 members worldwide. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. ASHRAE HITEC University Student Chapter was inaugurated on March, 6th 2014 and currently being supervised by Dr. Abdul Waheed Badar.



Department of Computer Engineering



Prof. Dr. Saad Rehman
Chairman

The Department of Computer Engineering (DCE) was established in 2014 with the objective to furnish students with quality education and prepare them for a rewarding future. The Department focuses on practical and technical skills of the students which can be effectively used to meet their responsibilities towards society and humanity. The department has experienced, dedicated and foreign qualified faculty for its undergraduate and postgraduate programs. The curriculum of each program meets the criteria set by Higher Education Commission of Pakistan and Pakistan Engineering Council (PEC) influenced by industrial perspectives. DCE emphasizes on Outcome Based Education (OBE) principles laid down by the Washington Accord and has been accredited by PEC. The department has several computer laboratories with state-of-the-art and up-dated equipment to fulfil the academic, research and development requirements. Teaching and technical staff of the department support each student to explore his/her interest and capabilities.

The Bachelor of Science in Computer Engineering (BSCE) program has been designed to prepare computer engineers, fully capable of effectively applying emerging computer engineering knowledge to meet future challenges of the world. The students are trained to understand modern technologies, design concepts & methodologies, and develop products or processes by applying their professional knowledge of mathematics, computing, and engineering. Our graduates will play pivotal role as a multi-disciplinary team member

in the national and international market in connection with automation, design, research and development.

The aim of postgraduate program is to enhance the computer engineering knowledge and motivate students towards the latest academic researches of computer engineering. The Department is offering MS in Computer Engineering with effect from Fall 2018 keeping in view ever increasing demands of the industry, availability of the foreign qualified faculty and the supporting facilities and resources. The curriculum has been designed to cover advanced technologies and the cutting-edge computer engineering areas in order to make it more attractive for the students.

DCE emphasizes on social responsibilities of students through community service and encourages students for extra-curricular activities within and outside of HITEC university premises for personality building. Our undergraduate and postgraduate students secure a bright future due to the high standards set by the department. We look forward to seeing you in our department where you can study to build an exciting career in one of the most promising academic programs of this era.



Faculty

Dr. Muhammad Younus Javed (HEC Approved Supervisor)

Designation: Professor & Vice Chancellor
Qualification: PhD, University of Dundee, Scotland, United Kingdom.
Area of Interest: Distributed and Parallel Systems, Digital Image Processing, Algorithms, Computer Networks.
E-mail: myjaved@hitecuni.edu.pk

Dr. Saad Rehman (HEC Approved Supervisor)

Designation: Professor & Chairman
Qualification: PhD, University of Sussex, Brighton, United Kingdom.
Area of Interest: Digital Image Processing, Digital System Design, Correlation Pattern Recognition, Computer Networks.
E-mail: saad.rehman@hitecuni.edu.pk

Dr. Hashim Ali (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD, University of Milano-Bicocca, Italy.
Area of Interest: Computer Architecture, Embedded Systems, Pervasive Computing.
E-mail: hashim.ali@hitecuni.edu.pk

Dr. Imran Ashraf (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD, TU Delft, The Netherlands.
Area of Interest: Advanced Profiling, Heterogeneous Computing, Quantum Computing, Compiler Technology.
E-mail: imran.ashraf@hitecuni.edu.pk

Dr. Saima Shaheen

Designation: Assistant Professor
Qualification: PhD, National University of Sciences and Technology, Islamabad, Pakistan.
Area of Interest: Computer Networks, Computer Vision, Image and Video Processing, Multimedia Computation, Digital Image Processing.
E-mail: saima.shaheen@hitecuni.edu.pk

Mr. Tehseen Ahsan

Designation: Assistant Professor
Qualification: MS, University of Surrey, Surrey, UK.
Area of Interest: Deep Learning, Secure Communications, Communication Systems.
E-mail: tehseen.ahsan@hitecuni.edu.pk

Ms. Anam Rafique

Designation: Assistant Professor
Qualification: MS, UET Taxila, Pakistan.
Area of Interest: Digital Signal Processing
Email: anam.rafiq@hitecuni.edu.pk

Ms. Veena Dillshad

Designation: Assistant Professor
Qualification: MS, National University of Sciences and Technology, Islamabad, Pakistan.
Area of Interest: Wireless Sensor Networks, Software Engineering.
Email: veena.dillshad@hitecuni.edu.pk

Mr. Amir Ijaz

Designation: Lecturer
Qualification: MS, FAST Islamabad, Pakistan.
Area of Interest: Computer Networks.
Email: amir.ijaz@hitecuni.edu.pk

Mr. Tauqeer Anjum

Designation: Lecturer
Qualification: MS, University of Keil, Germany.
Area of Interest: Signal Processing.
Email: tauqeer.anjum@hitecuni.edu.pk

Ms. Sara Tehsin

Designation: Lecturer
Qualification: MS, National University of Sciences and Technology, Islamabad, Pakistan.
Area of Interest: Image Processing, Pattern Recognition, Machine Learning and Neural Networks.
Email: sara.tehsin@hitecuni.edu.pk

Ms. Kaynat Rana

Designation: Lab Engineer
Qualification: BS, COMSATS WAH, Pakistan.
Area of Interest: Computer Architecture, Embedded Systems.
Email: kaynat@hitecuni.edu.pk

Mr. Shahbaz Khan

Designation: Lab Engineer
Qualification: BS, CASE, Islamabad, Pakistan.
Area of Interest: Digital System Design, Digital Logic Design, Computer Architecture.
Email: shahbaz.ce@hitecuni.edu.pk

Mr. Basit Akram

Designation: Lab Engineer
Qualification: BS, Bahria University, Islamabad, Pakistan.
Area of Interest: Digital System Design, Digital Logic Design, Computer Architecture.
Email: basit.akram@hitecuni.edu.pk

Mr. Jawad Qamar

Designation: Lab Engineer
Qualification: BS, UET Taxila, Pakistan.
Area of Interest: Internet of things (IoT), Smart and Autonomous Systems, Embedded Systems.
Email: jawad.qamar@hitecuni.edu.pk

BS Computer Engineering

The Bachelor of Science Computer Engineering (BSCE) program has been designed to produce quality computer engineers for taking competitive jobs in the national and international market relating to the field of computer engineering. This program focuses on the integration of concepts of software and hardware knowledge for design, development and operation of real-time computer systems. In the present era, the sophisticated computer-based systems permeate all spheres of life and are being actively used in a wide variety of engineering disciplines and technologies. The BSCE discipline covers modern applications covering electronics, logic design, computer architecture, algorithmics, programming, signals & systems, communication networks, microprocessors & interfacing, communication systems, digital system design, embedded systems, parallel and distributed computing, communications systems, digital signal processing, digital image processing, etc. The BSCE curriculum meets requirements of Pakistan Engineering Council (PEC) and Higher Education Commission (HEC) of Pakistan.

The duration of the program is 4 years (8 semesters) and consists of courses from a wide range of topics which are taught at foundation, breadth and depth level of computer engineering. The foundation courses provide basic concepts to the students to understand fundamentals of computer engineering. The breadth level courses give exposure to a number of important areas closely related to the field of computer engineering and the depth level courses offer advanced topics and contain a substantial design component. In the last two semesters, every student is required to take a six credit hours' final year project that involves design, testing, analysis and implementation of a prototype system, which covers both hardware and software. To thoroughly understand design concepts pertaining to the field of computer engineering, a number of mathematics courses have also been included in the curriculum. We strongly believe that the in-depth knowledge of computer engineering and allied disciplines is extremely useful for our students in order to find right

solutions for the complex engineering problems. In this context, our program consists of realistic proportion of computer and electrical engineering courses that make a solid foundation for the design and implementation of efficient and effective automated computer systems for their optimized performance. The semester-wise breakdown of BS Computer Engineering curriculum is appended as follows: -



Curriculum

Semester-1

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------------------------|--------------|
| BS-101 | Engineering Physics | 3+0 |
| HS-101 | English | 3+0 |
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| EE-102 | Electric Circuit Analysis | 3+1 |
| HS-102 | Pakistan Studies | 2+0 |
| EC-110 | Computing Fundamentals | 2+1 |
| Total Credit Hours: | | 18 |

Semester-2

| Course Code | Course Title | Credit Hours |
|----------------------------|---------------------------------|--------------|
| EE-101 | Engineering Workshop | 0+1 |
| HS-103 | Communication Skills | 3+0 |
| CS-102 | Programming Fundamentals | 3+1 |
| EE-205 | Electronic Devices and Circuits | 3+1 |
| EC-225 | Discrete Structures | 3+0 |
| MT-303 | Applied Linear Algebra | 2+0 |
| Total Credit Hours: | | 17 |

Semester-3

| Course Code | Course Title | Credit Hours |
|---------------------------|-----------------------------------|--------------|
| MT-103 | Differential Equations | 3+0 |
| EC-121 | Digital Logic Design | 3+1 |
| HS-201 | Technical Report Writing | 3+0 |
| HS-203 | Community Service | 0+1 (NC) |
| IS-211 | Islamic Studies | 2+0 |
| ME-211 | Computer Aided Engineering Design | 0+1 |
| EC-230 | Object Oriented Programming | 3+1 |
| Total Credit Hours | | 17 |

Semester-4

| Course Code | Course Title | Credit Hours |
|---------------------------|--|--------------|
| MT-201 | Complex Variable and Transforms | 3+0 |
| EC-231 | Operating Systems | 3+1 |
| EC-222 | Data Structures & Algorithms | 3+1 |
| EC-223 | Signals and Systems | 3+1 |
| EC-228 | Computer Architecture and Organization | 3+1 |
| Total Credit Hours | | 19 |

Semester-5

| Course Code | Course Title | Credit Hours |
|---------------------------|---|--------------|
| MT-202 | Numerical Methods | 2+1 |
| CS-204 | Software Engineering | 3+0 |
| EC-332 | Computer Communication Networks | 3+1 |
| EC-333 | Microprocessor and Interfacing Techniques | 3+1 |
| EC-334 | Database Systems | 3+1 |
| Total Credit Hours | | 18 |

Semester-6

| Course Code | Course Title | Credit Hours |
|---------------------------|--------------------------------|--------------|
| MT-302 | Probability and Statistics | 3+0 |
| EC-201 | Engineering Project Management | 3+0 |
| EC-341 | Digital System Design | 3+1 |
| EC-390 | Digital Signal Processing | 3+1 |
| xx-xxx | EC Depth Elective - I | 2+1 |
| Total Credit Hours | | 17 |

Semester-7

| Course Code | Course Title | Credit Hours |
|---------------------------|---------------------------------|--------------|
| HS-401 | Professional Values & Ethics | 2+0 |
| HS-403 | Management and Entrepreneurship | 3+0 |
| HS-404 | Foreign Language | 1+1 |
| xx-xxx | EC Depth Elective - II | 2+1 |
| xx-xxx | IDEE - I | 2+1 |
| EC-499 | Final Year Project - I | 0+3 |
| Total Credit Hours | | 16 |

Semester-8

| Course Code | Course Title | Credit Hours |
|---------------------------|-------------------------------|--------------|
| HS-402 | Economics | 2+0 |
| ME-407 | Health Safety and Environment | 1+0 |
| xx-xxx | EC Depth Elective - III | 2+1 |
| xx-xxx | EC Depth Elective - IV | 2+1 |
| xx-xxx | IDEE - II | 2+1 |
| EC-499 | Final Year Project – II | 0+3 |
| Total Credit Hours | | 15 |

Elective Courses

| Course Code | Course Title | Credit Hours |
|-------------|------------------------------------|--------------|
| EC-350 | Control Engineering | 3+0 |
| EC-442 | Embedded Systems | 2+1 |
| EC-444 | Parallel and Distributed Computing | 2+1 |
| EC-445 | System Programming | 2+1 |
| EC-448 | Introduction to Robotics | 2+1 |
| EC-465 | Software Project Management | 2+1 |
| EC-467 | Mobile Application Development | 2+1 |
| CS-305 | Computer Graphics | 2+1 |
| EC-481 | Wireless and Mobile Networks | 3+0 |
| EC-482 | Network Security and Cryptography | 3+0 |
| EC-483 | Fault Tolerant Computing | 3+0 |

Inter-Disciplinary Engineering Elective Courses

| Course Code | Course Title | Credit Hours |
|-------------|-----------------------------|--------------|
| CS-302 | Artificial Intelligence | 2+1 |
| CS-308 | Software Quality Assurance | 3+0 |
| CS-309 | Web Application Engineering | 2+1 |
| CS-406 | Digital Image Processing | 2+1 |
| CS-407 | Fundamentals of Data Mining | 2+1 |
| EE-304 | Communication Systems | 3+0 |



Course Contents

BS-101: Engineering Physics

Wave Motion, mathematical concepts of simple damped harmonic motion, analytical treatments of superposition of waves, basics of electricity (Ohm's law KCL KVL), electric charge, Coulomb's Law, electric field and intensity, electric potential, capacitors and charge storage concepts, magnetism, magnetic fields, Faraday's and Lenz's laws, Ampere's law and its applications, Eddy currents, inductance, induced current and their applications, basics of optics, introduction to semiconductor physics, atomic structure of elements, energy band diagram for solids, intrinsic semiconductor and extrinsic semiconductors, electron hole pairs, distribution of electrons and holes in a conduction and valence band, recombination and lifetime.

EE-101: Engineering Workshop

For contents, please refer to page number 24.

HS-101: English

For contents, please refer to page number 24.

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 149.

EE-102: Electric Circuit Analysis

For contents, please refer to page number 24.

HS-102: Pakistan Studies

For contents, please refer to page number 173.

HS-103: Communication Skills

For contents, please refer to page number 24.

MT-103: Differential Equations

For contents, please refer to page number 149.

EC-110: Computing Fundamentals

Introduction to numbers systems, CPU, memory, input/output devices, data organization, file storage, programs

and software, system and application software, operating systems, communication technology, compiler, DBMS, computer networks and internet, WWW, webmail applications, computer graphics, AI, viruses and anti-viruses, programming languages, compilation and interpretation, problem specification, algorithms, flowchart, pseudo code, basic programming techniques, data types and declaration, header file and linkage, variables and constants, arrays, input/output, termination, remark, control structures, branching, conditional structures, repetition and loops, basic library functions.

CS-102: Programming Fundamentals

For contents, please refer to page number 105.

EC-121: Digital Logic Design

Number systems, logic gates, boolean algebra, combinational logic circuits and designs, simplification methods K-maps, QuineMcCluskey, flip flops and latches, asynchronous and synchronous circuits, counters, shift registers, shift registers counters, triggered devices & its types, binary arithmetic and arithmetic circuits, memory elements, state machines, introduction programmable logic devices (CPLD, FPGA), lab assignments using tools such as Verilog HDL/VHDL, Logisim, etc.

EC-201: Engineering Project Management

To develop ability to plan and manage computer engineering projects successfully, maximizing the return from each stage of the hardware and software development life cycle.

HS-201: Technical Report Writing

For contents, please refer to page number 25.

MT-201: Complex Variables and Transforms

For contents, please refer to page number 149.

MT-202: Numerical Methods

For contents, please refer to page number 149.

HS-203: Community Service.

For contents, please refer to page number 25.

CS-204: Software Engineering

For contents, please refer to page number 106.

EE-205: Electronic Devices and Circuits

For contents, please refer to page number 25.

IS-211: Islamic Studies

For contents, please refer to page number 172.

ME-211: Computer Aided Engineering Drawing

For contents, please refer to page number 61.

EC-222: Data Structures & Algorithms

Fundamentals of data structures, data types, abstract data types, user defined data types, algorithms and their complexity, time-space trade off, arrays, records and pointers, matrices, linked lists, circular lists, two way lists, sequential (array) and linked implementation of stacks and queues, polish notation, recursion, towers of Hanoi, recursive implementation of stacks and queues, priority queues, tree, binary tree, binary search tree, traversals, heap, general trees, graphs, depth-first/breadth first traversal, adjacency matrix, shortest distance algorithms, sorting (insertion sort, selection sort, merge sort, radix sort), hashing, searching: (linear search, binary search, depth first /breadth first search).

EC-223: Signal and Systems

Linear time-invariant systems, convolution integral for continuous-time systems, convolution sum for discrete-time systems, properties of linear time-invariant systems, systems described by differential and difference equations, Fourier Series, properties of continuous-time

Fourier series, continuous-time Fourier transform and its inverse, properties of the transform, common transform pairs, discrete-time Fourier transform and its properties, frequency response corresponding to difference equations. Sampling, uniform sampling, sampling theorem, aliasing, decimation, interpolation. Laplace Transform, region of convergence, properties, analysis of LTI systems, solution of differential equations, continuous and discrete-time filtering.

EC-225: Discrete Structures

The Foundation: logic and proofs, basic structures, sets, functions, sequence, and sums, the fundamentals: algorithm, the integers, and matrices, induction and recursion, counting, advanced counting techniques, relations, graphs, trees, Boolean algebra, modeling computation.

EC-228: Computer Architecture and Organization

Difference between architecture & organization, introduction to Flynn's classification of computer architecture (SISD, SIMD, MISD, MIMD systems), design of computer systems and components, processor design, CPU architecture, functional blocks and development of instruction set, design of basic functional blocks (PC, IR, CU, ALU etc.), instruction set design, and addressing, control structures and microprogramming, memory management, caches, and memory hierarchies, and interrupts and I/O structures, pipelining of processor Issues and hurdles, exception handling, parallelism, multiprocessor systems, Introduction to superscalar processors (CISC, RISC), cache memory, different designs of cache memory system, virtual memory system, address mapping using pages, pipelining and threading, instruction level parallelism (ILP), introduction to parallel processing, branch prediction, pre-fetching, multithreading.

EC-230: Object Oriented Programming

Concepts of object oriented paradigm, encapsulation,



inheritance, polymorphism, abstract classes and interfaces, overloading and overriding, object-oriented design, event-driven programming, Event propagation, exception handling, threading, multi-threading, packages, recursion, use of stacks, queues and lists from API, building GUI applications.

EC-231: Operating Systems

Evolution of operating systems, different types of operating systems, computing environment, computer system operation, I/O and storage structure, hardware protection, system architecture, system components, services, system calls & programs, virtual machines, systems design and implementation, process scheduling, operations on processes, inter-process communication, client-server systems, threads & threading models, thread types & issues, threads on popular operating systems, CPU scheduling, criteria & algorithms, real-time scheduling & solution, critical-section problem, synchronization, critical-section resolution methods, deadlock characterization, handling of deadlocks, deadlock prevention, detection & recovery,

address binding for memory management, swapping, memory allocation, paging, segmentation, virtual memory, file system concept, access methods & protection.

MT-302: Probability and Statistics

For contents, please refer to page number 150.

CS-302: Artificial Intelligence

For contents, please refer to page number 107.

EE-304: Communication Systems

For contents, please refer to page number 27.

CS-305: Computer Graphics

For contents, please refer to page number 108.

CS-308: Software Quality Assurance

For contents, please refer to page number 108.

CS-309: Web Design & Development

For contents, please refer to page number 109.



EC-332: Computer Communication Networks

Introduction of computer networks and services, network design principles, OSI and TCP/IP reference models, network topologies, the physical layer and data communication fundamentals, transmission medias, data encoding, data communication interfaces, data link layer and its protocols, multiplexing, FDM and TDM, medium access control and various multiple access methods, ethernet and token ring systems, wide area networks, network layer and routing, hub, bridges and switches, internetworking, IP protocol, IP addressing, transport layer, services provided by transport layer, TCP & UDP, congestion control & quality of service, application layer, domain name system, world wide web, overview of network security.

EC-333: Microprocessor and Interfacing Techniques

Introduction to microprocessors and microcontrollers, microprocessor organization, internal/external architecture of example microprocessors, addressing techniques, addressing modes, machine language coding and the debug software development program, instruction set, assembly language program development through hardware and the MASM assembler, memory devices, cycles and sequencing, interfacing, microcontrollers, microprocessor applications, interrupts and ISRs, timings I/O interfacing.

EC-334: Database Systems

User interface, data independence, user view, three data models (relational, hierarchical, network, object oriented), conceptual, logical and physical database design and evaluation, normalization, query languages, query optimization, security, integrity and concurrency protocols, introduction to SQL and its application to RDBMS, database design, model building, data table, forms & reports, database administration.

EC-341: Digital System Design

High-level digital design methodology using VHDL/ Verilog, design, implementation, and verification, application requiring HW implementation, floating-point to fixed-point conversion, architectures for basic building blocks, adder, compression trees, and multipliers, transformation for high speed using pipelining, retiming, and parallel processing, dedicated fully parallel architecture, time shared architecture, hardwired state machine based design, micro program state machine based design, FPGA-based design and logic synthesis.

EC-390: Digital Signal Processing

Applications of DSP, digital signals, systems and convolution, flip and slide convolution & frequency response, Fourier transform and frequency response, discrete time Fourier transform, symmetry properties, sampling theorem & D/A reconstruction, DFT and FFT algorithms, DFT properties & circular convolution (spectrum analysis & windowing), FFT algorithms and high speed (block) convolution, Z-transform and its properties with inverse, FIR and IIR filters and their implementations, FIR filter design methods, IIR filter design methods, resolution & side lobes, spectrum analysis, power spectrum for random signals, porting of DSP algorithms on embedded systems especially on DSP chips including fixed point programming.

HS-401: Professional Values & Ethics

For contents, please refer to page number 173.

HS-402: Economics

For contents, please refer to page number 28.

HS-403: Management and Entrepreneurship

For contents, please refer to page number 29.

HS-404: Foreign Language

For contents, please refer to page number 30.

CS-406: Digital Image Processing

For contents, please refer to page number 111.

CS-407: Fundamentals of Data Mining

For contents, please refer to page number 111.

ME-407: Health Safety and Environment

For contents, please refer to page number 63.

EC-442: Embedded Systems

Trends and challenges in embedded system design, the microcontroller architecture, assembly language programming, addressing modes and instruction set, I/O

ports programming, TIMER and SERIAL and PARALLEL port programming, interrupts, interfacing, A/D and D/A conversion, interfacing and application using PWM

EC-444: Parallel and Distributed Computing

This course introduces the concepts and design of distributed computing systems, difference between processes and processors, parallel computer architecture, introduction to parallel programming, performance measurement, process management and migration, message passing, remote procedure calls (RPC), Java RMI, CORBA, service oriented architecture (SOA), mobile agents, distributed coordination, distributed shared memory, distributed file systems and fault tolerance.

EC-445: System Programming

Introduction to system program, Linux architecture: overview & basics, programs, processes & threads, file and directory structure, i/o processes, i/o efficiency, error handling, user identification, file sharing, atomic operations, file types, file access permissions, UNIX special files, pipes, terminal control & queues, login accounting, system identification, time and date routines,



signals & timers, signal concepts, signal function, interrupted system calls, POSIX threads, thread limits, thread attributes, synchronization attributes, reentrancy, thread synchronization.

EC-448: Introduction to Robotics

Introduction, components and subsystems, object localization, spatial description and transformations, kinematics (manipulator position / motion), statics, dynamics, mobile robots, task planning, sensors measurement and perception, control, programming.

C-465: Software Project Management

Introduction to project management, principles of project management, integrated software engineering project planning (project infrastructure, characteristics, activities (work breakdown structure), iterative planning, size, resource, cost and schedule estimation), project activity planning (network), resource requirements, scheduling, and allocation, monitoring and controlling progress, project organization and staffing, risk analysis and management, client management, project direction and control, project progress visibility: matrices and measurement, configuration management.

EC-467: Mobile Application Development

Introduction to mobile computing, development environment, factors in developing mobile applications, HTML5 for mobiles, frameworks, user-interface, text-to-speech techniques, intents and services, storing and retrieving data, communications via network and the web, telephony, notifications and alarms, graphics, multimedia, location, hardware sensors, developers and app store license agreements, security and hacking, platforms issue.

EC-481: Wireless and Mobile Networks

introduction to wireless communication, wired vs. wireless communication, electromagnetic spectrum, design challenges, wireless transmission, evolution

of wireless networks, channel planning for wireless system, issues, QoS, security, multimedia services and applications, WLANS, WiMax, wireless pan, CDMA One/ IS-95, wireless CDMA design considerations, walsh codes, IS- 95 reverse link, EDGE, WCDMA/ UMTS, transport and physical channels, signaling, physical layer procedures, compressed mode measurements, handover measurements, CDMA-2000, mobile ad hoc, security, WEP protocol, mobile IP, introduction to wireless mesh networks, characteristics, WSN, high rate WPAN ZigBee, OFDM, OFDMA, fundamentals of cellular concepts, 1G/2G/2.5G/3G cellular networks, trunking and grade of service, measuring traffic intensity, trunked systems, Erlang charts, improving coverage and capacity, GSM specifications, call routing in GSM, GPRS, EDGE, limitation of 3G, 4G objectives, 4G overview, mobility management, handoff types, QoS considerations.

EC-482: Network Security and Cryptography

Introduction, computer security concepts, OSI security architecture, classical encryption techniques, block ciphers and stream cipher, passive attacks, active attacks, symmetric encryption, RC4, public key cryptography DES, triple DES, AES, key distribution and user authentication, cryptographic hash functions MD5, digital signatures, key management and distribution, user authentication protocols, TLS, malicious software, firewall, HTTPS, S/ MIME, security attacks, DoS attacks, spoofing, spams, session hijacking, wireless security, internet security, antiviruses, digital immune system.

EC-483: Fault Tolerant Computing

Introduction to digital system testing, economics of testing, fault models, test generation at gate level and switch level, random test generation, BIST for memories, fault diagnosis and reconfiguration, simulation based test generation, design for testability..

MS Computer Engineering Program

The Department of Computer Science and Engineering offers the Master of Science degree in Computer Engineering (MSCE). The MSCE program is designed to prepare students for technically demanding careers in industry as well as for higher studies in computer engineering. It involves knowledge of hardware and software development. The students learn how to design new generations of computers and embedded computing systems such as those found in smartphones, cars, appliances, computer networks, smart factories and the internet-of-things. The program covers the entire digital integrated circuit design process targeting Field Programmable Gate Arrays (FPGAs) and Application Specific Integrated Circuits (ASICs) using various optimization criteria such as speed, cost, power, energy, reliability and security. It also encompasses the complete software development process targeting microcontrollers, microprocessors, multi-cores and Graphics Processing Units (GPUs). It teaches students how to efficiently partition the system into software and hardware components, and develop high-performance interfaces between these two parts. It exposes students to modern computer-aided design tools for hardware and software design. To fulfill the MS degree requirements, a student needs to complete 30 credit hours. Thesis and Non-thesis options are available to the students. The thesis option requires 8 courses of 24 credit hours and 6 credit hours of thesis whereas for the non-thesis option, a student is required to take 10 courses of 30 credit hours besides writing a technical report on the given topic. The curriculum is given as follows: -

Curriculum

Semester-1

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------|--------------|
| EC-xxx | Core – I | 3+0 |
| EC-xxx | Core – II | 3+0 |
| xx-xxx | Elective – I | 3+0 |
| Total Credit Hours: | | 9 |

Semester-2

| Course Code | Course Title | Credit Hours |
|----------------------------|-----------------------------|--------------|
| EC-xxx | Core – III | 3+0 |
| EC-xxx | Specialization Elective – I | 3+0 |
| xx-xxx | Elective – II | 3+0 |
| Total Credit Hours: | | 9 |

Semester-3

| Course Code | Course Title | Credit Hours |
|----------------------------|------------------------------|--------------|
| EC-xxx | Specialization Elective – II | 3+0 |
| xx-xxx | Elective – III | 3+0 |
| EC-899 | Thesis | 3+0 |
| Total Credit Hours: | | 9 |

Semester-4

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------|--------------|
| EC-899 | Thesis | 3+0 |
| Total Credit Hours: | | 3 |



List of Core Courses for MS CE

The candidate has to complete a minimum of three core courses from the following list. The department may offer core/elective courses from the given list, but not limited to this list, as per the availability of resources.

| Course Code | Course Title | Credit Hours |
|-------------|--|--------------|
| EC-801 | Advanced Computer Architecture | 3+0 |
| EC-802 | Advanced Digital Systems Design | 3+0 |
| EC-803 | VLSI Architecture and Design Methodologies | 3+0 |
| EC-821 | Advanced Embedded Systems | 3+0 |
| EC-831 | Advanced Digital Signal Processing | 3+0 |
| EC-899 | Thesis | 6+0 |

Candidate has to select a minimum of two (2) from specialization electives and three (3) courses from general electives.

List of Specialization Courses for MS CE

| Course Code | Course Title | Credit Hours |
|-------------|--|--------------|
| EC-804 | Advanced Microprocessor and Microcontroller Design | 3+0 |
| EC-805 | Microcontroller System Design and Applications | 3+0 |
| EC-806 | System on Chip Design | 3+0 |
| EC-807 | HW/SW Co-Design | 3+0 |
| EC-808 | FPGA Based Systems | 3+0 |
| EC-809 | DSP Integrated Circuits | 3+0 |
| EC-810 | Advanced FPGA Design | 3+0 |
| EC-811 | Parallel Processing Architecture | 3+0 |
| EC-812 | RISC Processor Architecture and Programming | 3+0 |

| | | |
|--------|---|-----|
| EC-813 | High Performance Programming with Multicore and GPUs | 3+0 |
| EC-822 | Embedded Communication Software Design | 3+0 |
| EC-823 | Architecture and Design of Distributed Embedded Systems | 3+0 |
| EC-824 | Software Modeling for Embedded Systems | 3+0 |
| EC-825 | Embedded Control Systems | 3+0 |
| EC-826 | Application of MEMS Technology | 3+0 |
| EC-829 | Real Time Operating Systems | 3+0 |
| EC-851 | Soft Computing | 3+0 |
| CS-878 | Intelligent Systems | 3+0 |
| EC-853 | Pattern Recognition & Analysis | 3+0 |
| EC-854 | Neural and Fuzzy Systems | 3+0 |
| CS-823 | Machine Learning | 3+0 |
| CS-824 | Artificial Neural Networks | 3+0 |
| EC-872 | Data Communication & Networks | 3+0 |
| EC-876 | Embedded Wireless Sensor Networks | 3+0 |
| EC-877 | Embedded Networking | 3+0 |
| EC-878 | Adhoc Networks | 3+0 |
| EC-879 | Distributed Embedded Computing | 3+0 |
| CS-811 | Advanced Computer Networks | 3+0 |
| CS-815 | Cryptography & Network Security | 3+0 |
| CS-859 | Mobile and Pervasive Computing | 3+0 |

List of General Electives Courses for MS CE

| Course Code | Course Title | Credit Hours |
|-------------|--|--------------|
| CS-802 | Advanced Algorithms Analysis | 3+0 |
| CS-814 | Multimedia Communication | 3+0 |
| CS-819 | Information Theory & Coding | 3+0 |
| CS-822 | Advanced Digital Image Processing | 3+0 |
| CS-827 | Advanced Pattern Recognition | 3+0 |
| EC-832 | Advanced Digital Image Processing and Applications | 3+0 |
| CS-829 | Advanced Computer Vision | 3+0 |
| EC-842 | Wireless and Mobile Communication | 3+0 |
| EE-844 | Research Methodologies (Compulsory) | 3+0 |
| CS-857 | Parallel & Distributed Systems | 3+0 |
| EC-861 | Advanced Operating Systems | 3+0 |
| CS-879 | Multimedia Systems and Applications | 3+0 |
| EC-890 | Robotics and Control | 3+0 |
| EC-891 | Pervasive Devices and Technology | 3+0 |
| EC-892 | Real Time Systems | 3+0 |
| EC-893 | Applied Mathematics for Engineers | 3+0 |
| EE-813 | Real Time DSP Design and Application | 3+0 |

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| EE-817 | Statistical Signal Processing | 3+0 |
| EE-819 | Array Signal Processing | 3+0 |
| EE-823 | Advanced Digital Communication | 3+0 |
| EE-828 | Smart Antennas | 3+0 |
| CS-831 | Advanced Database Management Systems | 3+0 |
| CS-832 | Data Mining | 3+0 |
| CS-833 | Data Warehousing | 3+0 |
| CS-834 | Web Engineering | 3+0 |
| CS-835 | Advanced Web Analytics | 3+0 |
| CS-836 | Semantic Web | 3+0 |
| CS-841 | Advanced Software Engineering | 3+0 |
| CS-843 | Software Quality Assurance | 3+0 |
| CS-880 | Mobile Communication Systems | 3+0 |
| CS-883 | Advanced Cloud Computing | 3+0 |
| CS-885 | High Performance Computing | 3+0 |
| CS-920 | Selected Topics in Digital Image Processing | 3+0 |

Department of Civil Engineering



Dr. Sabahat Hussan
Chairman

Launching the department of Civil Engineering is the latest initiative of HITEC University. It has, however, taken nearly three years of requirement analysis, a deep appraisal of Civil Engineering offered by other institutions and the unique and distinguishing features which should be the Hallmark of our Program. Civil Engineering department of HITEC University enshrines the same attributes due to which our other programs are recognized, at the national and international levels. These attributes are top class faculty, very well equipped laboratories and the unstinted commitments to impart state-of-the-art knowledge. All those who desire to study Civil Engineering must select a university which pursues the Outcome Based Education (OBE) philosophy and functions under the Washington Accord criteria of quality teaching and learning with

respect to this vital point. Our Civil Engineering program stands to benefit from our proud legacy of 5-years. The Civil Engineering department has highly qualified and dedicated faculty with diverse intellect, creativity and talent. The department hosts excellent laboratories stocked with latest equipment and are placed in environmentally controlled premises. Besides its own laboratories, the department shares requisite facilities of Electrical, Mechanical and Computer engineering departments. The department follows the curriculum as per guidelines of Higher Education Commission (HEC) and Pakistan Engineering Council (PEC). The subjects of the program fully meet the diverse knowledge which constitutes vibrant and ever evolving demands of Civil Engineering discipline.

The Civil Engineering department is endowed with all these essentials which are found in any reputed university. We, however, do consider our students to be the most valued asset. If you happen to be those fortunate students who wish to pursue a career in Civil Engineering, we commit to impart the knowledge, the professional skills and a positive attitude to realize your dreams. We will groom you into professionals who are always in demand in the national and international market.

Faculty (For First Two Semesters)

Dr. Sabahat Hussan (HEC Approved Supervisor)

Designation: Assistant Professor/Chairman
Qualification: PhD (Civil Engineering), UET, Taxila
Areas of Interest: Transportation Engineering, Pavement Materials, Highway Engineering
Contact: sabahat.hasan@hitecuni.edu.pk

Engr. Yasir Rasheed

Designation: Lecturer
Qualification: MS (Structural Engineering), CECOS University, Peshawar
Areas of Interest: Dynamics of Structures, Properties of Green Concrete
Contact: yaserrasheed@ymail.com

Engr. Muhammad Nasir Ayaz Khan

Designation: Lecturer
Qualification: MS (Structural Engineering), CECOS University, Peshawar
Areas of Interest: Fire Resistant Structure, Gamma Radiation on Building Materials
Contact: nasir.ayaz@hitecuni.edu.pk Ext. 392

Engr. Muhammad Naeem Bashir Awan

Designation: Lecturer
Qualification: MS (Geo-technical Engineering), NUST, Islamabad
Area of Interest: Geotechnical Soil Investigation, Slope Stability Analysis, Construction Management
Contact: naeem.bashir@hitecuni.edu.pk Ext. 390

Engr. Fatima Ashfaq

Designation: Lab Engineer
Qualification: MSc in progress (Transportation Engineering), UET, Taxila
Areas of Interest: Rutting Behavior of Asphalt Mixtures
Contact: Fatima.ashfaq@hitecuni.edu.pk

BS Civil Engineering

Civil Engineering, usually includes a variety of engineering specialties like structural engineering, transportation systems, fluid mechanics, water resources, geo-systems and environmental engineering etc. Recent regional infrastructure development, consisting of a series of mega projects, to be accomplished under China Pakistan Economic Corridor (CPEC), requires proficient and skilled civil engineers. CPEC is intended to be of strategic importance to Pakistan and entails energy producing projects, enhancing transportation infrastructure, development of dedicated economic zones and boosting the tourism industry. Similarly, the recent water-scarcity awareness at national level highlights the significance of constructing new water reservoirs. Needless to say that water storage dams and their infrastructure including the downstream distribution networks do require a very large number of competent and well versed civil engineers.

Civil Engineers are employed in a broad spectrum of engineering situations like construction firms, manufacturing companies, power companies, petroleum industry, mining concerns and consulting engineering firms. Many opportunities for Civil Engineering employment also exist in district, provincial and federal engineering departments as well.

The Department of Civil Engineering has been established in 2019. Currently this department offers BS in Civil Engineering. The curriculum is in line with the requirements of Pakistan Engineering Council (PEC) and is comprehensive enough to meet all challenges and requirements of the field of Civil Engineering both at national and international levels.

In an attempt to facilitate our undergraduate students and to enhance their capability to identify real world problems

and recommend economically and environmentally viable solutions, the Department has set up a well-coordinated guiding system that provides counseling and support to the students. Every student is advised and encouraged to interact with other students and faculty members, so that, after the completion of BS program, they have better understanding of their field of choice and contribute to the society as professionally mature team leaders.

After the completion of the program, the degree of BS Civil Engineering is conferred and the accompanying transcript of grades reflecting the sequence of subjects studied and qualified. The program spans over four years (eight semesters) and comprises 139 credit hours.



Curriculum

Semester-1

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------------------|------------|
| CE-101 | Engineering Drawing | 1+2 |
| CE-102 | Engineering Mechanics | 2+1 |
| IS-211 | Islamic Studies | 2+0 |
| CE-103 | Basic Electro Mechanical Engineering | 2+2 |
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| HS-101 | English | 3+0 |
| Total Credit Hours | | 18 |

Semester-2

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------------------|------------|
| CE-104 | Surveying-I | 2+1 |
| CE-105 | Engineering Materials | 2+1 |
| HS-102 | Pakistan Studies | 2+0 |
| EC-110 | Computing Fundamentals | 2+1 |
| MT-104 | Linear Algebra and Vector Calculus | 2+0 |
| HS-103 | Communication Skills | 3+0 |
| ES-101 | Engineering Geology | 2+0 |
| Total Credit Hours | | 18 |

Semester-3

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------------|------------|
| CE-201 | Surveying-II | 2+1 |
| CE-202 | Engineering Practice | 3+0 |
| CE-203 | Fluid Mechanics-I | 2+1 |
| CE-204 | Quantity and cost Estimation | 2+1 |
| CE-206 | Mechanics of Solids-I | 2+1 |
| MT-103 | Differential Equations | 3+0 |
| Total Credit Hours | | 18 |

Semester-4

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------------------|------------|
| CE-205 | Structural Analysis-I | 3+0 |
| HS-401 | Professional Values & Ethics | 2+0 |
| CE-207 | Soil Mechanics | 3+1 |
| HS-201 | Technical Report Writing | 3+0 |
| MT-202 | Numerical Methods | 2+1 |
| HS-301 | Construction Planning & Management | 2+1 |
| HS-203 | Community Service | 0+1 (NC) |
| Total Credit Hours | | 18 |

Semester-5

| Course code | Course Title | Credit Hrs |
|---------------------------|--|------------|
| CE-301 | Structural Analysis-II | 3+0 |
| CE-302 | Mechanics of Solids-II | 2+1 |
| CE-303 | Geo-technical and Foundation Engineering | 3+1 |
| MT-302 | Probability & Statistics | 3+0 |
| CE-304 | Hydrology and Water Resources | 2+1 |
| HS-402 | Economics | 2+0 |
| Total Credit Hours | | 18 |

Semester-6

| Course code | Course Title | Credit Hrs |
|---------------------------|-------------------------------|------------|
| CE-305 | Environmental Engineering-I | 2+1 |
| CE-306 | Reinforced Concrete Design-I | 3+1 |
| CE-307 | Transportation Engineering-I | 3+0 |
| CE-308 | Steel Structures | 2+1 |
| CE-309 | Fluid Mechanics-II | 3+1 |
| ME-407 | Health Safety and Environment | 1+0 |
| Total Credit Hours | | 18 |

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------------|------------|
| CE-401 | Environmental Engineering-II | 2+0 |
| CE-402 | Reinforced Concrete Design-II | 3+1 |
| CE-403 | Transportation Engineering-II | 3+1 |
| HS-408 | Hazards and Disaster Management | 3+0 |
| CE-404 | Design Project-I | 0+3 |
| HS-404 | Foreign Language | 1+1 |
| Total Credit Hours | | 18 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|-------------------------------------|------------|
| CE-405 | Design of Structures | 1+2 |
| CE-406 | Hydraulics & Irrigation Engineering | 3+1 |
| CE-407 | Computer Aided Design | 1+2 |
| CE-404 | Design Project-II | 0+3 |
| Total Credit Hours | | 13 |

Course Contents:

CE-101: Engineering Drawing

Introduction to Engineering Drawing, sketch, painting, map and Types of Civil Engineering Drawings; Conceptual drawing, Projection system and its variables, Classification of projections, Perspective and parallel projections; Architectural views (Plan, elevation, and section) of a simple building, General terminologies and symbols including schedule of opening, Architectural design of a house; Covered area specification of various development authorities, General notes; Architectural and Structural Details of Boundary Wall and Staircase; sketching of Structural details of Water tank; Plumbing, sanitation, and Roof Drainage Plan of a Simple Building; Typical layout of electrification, Symbols used for electrical layout, Typical layout of HVAC, Symbols used for HVAC layout.

CE-102: Engineering Mechanics

Basic concepts of space, time, mass, velocity, acceleration, and force, Scalar and vector quantities; Newton's law of motion, Law of gravitation; System of Forces, Resultant and resolution of co-planer forces using parallelogram, triangle & polygon law; Introduction to shear force and

bending moment diagrams, Degree of restraint and static determinacy, Statically determinate problems especially of Civil Engineering importance; Kinetics, Work, energy, and power. Virtual work formulation of equilibrium of coplanar force; Potential energy, energy criterion for equilibrium, stability of equilibrium; Geometrical properties of plane areas; Friction, Coulomb's theory of friction; Application of Principles of Dynamics.

IS-211: Islamic Studies

For contents, please refer to page number 172.

CE-103: Basic Electro Mechanical Engineering

Electrical Elements and Circuits, Electric current, voltage, power and energy, Ohm's law, inductance, capacitance, Kirchoff's laws; Introduction to node voltage and loop current method; AC single and poly-phase system, DC machines, AC synchronous machines, AC induction machines, transformers converting machines; Power Plant Installations and Distribution System; Electronics, Diode transistor and simple rectifier circuit; Principles of house wiring and industrial wiring, illumination; Electrical



know how related to experimental design instrumentations like corrosion rate measurements, strain gauges, LDT's, LVDT's etc. Basic Concepts of heat transfer; Introduction to Heating Ventilation and Air Conditioning (HVAC).

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 149.

HS-101: English

For contents, please refer to page number 24.

MT-103: Differential Equations

For contents, please refer to page number 149.

CE-104: Surveying-I

Introduction to land surveying; Definitions of basic surveying terms branches and their application; Instruments used; Survey Techniques; Distance measurement techniques; Theodolite and its types; Compass Survey, Traversing and triangulation, bearings and meridians; plane table

surveying; Digital Theodolite; Leveling and Contouring; Computations of area and volumes by graphical analysis and use of surveying software.

CE-105: Engineering Materials

Introduction of materials, Construction materials, Physical properties, Mechanical properties, Chemical properties, Electrical & Thermal properties; Definition and Introduction of aggregates; Introduction about mortars; Introduction about concrete Ceramics and Bricks; History and evolution of blocks; Structure of plastics, Polymer technology; Constituents of glass, Use in Civil Engineering; Wood, General characteristics, Types, Seasoning of wood, Preservation of wood, Lamination of wood; Paints, Objectives, Composition; Metals, Introduction about metals; Types of steel; Bulking of sand and Slaking of clay.

HS-102: Pakistan Studies

For contents, please refer to page number 173.

EC-110: Computing Fundamentals

For contents, please refer to page number 77.

MT-104: Linear Algebra and Vector Calculus

Algebraic properties of matrixes, elementary row operations, echelon form of a matrix, rank of a matrix, inverse of a matrix; solving linear system with gauss elimination method, application of linear systems; determinants, Cramer's rule and applications; Vector calculus, vectors in 2-space and 3-space, vector product; arc length, gradient of scalar field; directional derivative, divergence and curl of vector field; line integrals, surface integrals, vector integrals; Green's theorem, divergence theorem of Gauss, Stokes theorem, Fourier series.

HS-103: Communication Skills

For contents, please refer to page number 24.

ES-101: Engineering Geology

Rocks and Minerals, Structural Features, Main groups.

Igneous, sedimentary, and metamorphic rocks; Effects of folding, Faulting and jointing on Civil Engineering projects and their recognition in the field; Weathering and Erosion; Landslides, Definition, causes of landslides, Classification of landslides, Preventive measures against landslides; Earthquakes, Definition and related technical terms, Causes of earthquake, Classification of earthquakes, Earthquake or seismic waves; Introduction to tunnels ; Exploratory geological surveys at engineering sites; Role of geology in selection of sites for dams, reservoirs, and pertinent geological investigations; Geology of foundations, cutting tunnels, highways, airfields, and bridges.

CE-201: Surveying-II

Surveying Drafting and Computations, Area by graphical analysis, Computation of area of traverse by independent coordinates and by DMD method; Highway and Railway Curves, Route surveys, Deflections, Setting out of curve, Design considerations, Super elevation; Construction Surveys; Hydrographic Surveys; Photogrammetry; Tunneling Surveying; Use of Gyroscope; Control Surveys; Global Positioning System (GPS).

CE-202: Engineering Practice

Introduction, Construction projects and their types, Construction Project Delivery Methods, codes and construction standards, Overview of Construction Sustainability; Construction Equipment; Factors affecting selection of construction equipment; Construction Methodology, Construction aspects related to services, Overview of other structures; Contract Law and Dispute Resolution; Construction Aspects of Engineering Projects, payment schemes in construction projects, contract/bidding documents.

CE-203: Fluid Mechanics-I

Properties of Fluid Mechanics, Units and dimensions, Fluid Kinematics, Fluid Dynamics, Physical properties of fluids; Fluid Statics, Pressure intensity and pressure

head, Piezometer, manometer, Pressure transducers, Differential manometer and Borden gauge; Forces on Immersed Bodies, Drag and lift forces, buoyancy and floatation, Equilibrium of floating and submerged bodies; Fluid Kinematics; Hydrodynamics / Energy Consideration in Steady Flow; Flow Measurement; Steady Flow through Pipes; Uniform Flow in Open Channels.

CE-206: Mechanics of Solids-I

Simple stress and strain, Relationship between elastic constants, Statically determinate and indeterminate compatibility problems, Compound bars, Temperature stresses; Analysis of Beams, Theory of simple bending, Stresses in composite section, Principle of superposition, Deflection of beams using double integration; Torsion of hollow and solid circular section, Shearing stress distribution; Column and Struts; Strain Energy; Springs; Torsion of Thin Walled Tubes and Non-Circular Members; Thin, Thick and Compound Cylinders; Fatigue.

CE-204: Quantity and Cost Estimation

Quantity Take-off, take-off rules and measurement accuracy, organization of take-offs, Construction, Brick Masonry, Stone Masonry, Rubble Masonry, Ashlar Masonry, Pre-Construction Site Works, safety in constructions, Dampness; Plastering, Pointing, Joints in Buildings, Maintenance of Buildings, Doors, Roofs, Floors, Stair-case; Need for Estimation, Essential Qualities of a good Estimator, Site condition affecting Estimate; Bill of Quantities (BOQ) & Measurement Book (MB), Types and methods of estimates, Working out quantities, rates, and cost analysis of construction materials, maintaining of Measurement Books.

MT-103: Differential Equations

For contents, please refer to page number 149.

CE-205: Structural Analysis-I

Introduction to structural analysis, types of structures, structural idealization, loads; Determinacy, indeterminacy and stability of structures, analysis of determinate trusses, Method of joints, Method of sections, Graphical method for analysis; Analysis of Statically Determinate Rigid jointed plane frame, Shear & bending moment diagrams of frames; Deflection, elastic curves, Energy methods, Castiglioni's theorem, Principle of virtual work; Rotation and deflection of beams by moment area method, Conjugate beam method, Influence line for statically determinate structures; Arches, Cables, and suspension bridges.

HS-401: Professional Values & Ethics

For contents, please refer to page number 173.

CE-207: Soil Mechanics

Soil and its constituents, Applications in engineering practice, Weathering of rocks and types of soil, Types of soil deposits, structure and clay minerals, Physical properties of soil; Soil Classification; Permeability and capillarity, Darcy's law, Factors affecting permeability, determination of permeability, Capillarity and effects, Theory of flow nets, Quick sand conditions; Shear Strength of Soil Coulomb's law, shear strength of cohesive and non-cohesive soils, Factors affecting shear strength; Stress Distribution, Geo-static stresses, total stress and pore pressure, Westergard and Boussineq's theories; Pressure bulb; Soil Improvement.

HS-201: Technical Report Writing

For contents, please refer to page number 25.

MT-202: Numerical Methods

For contents, please refer to page number 149.

HS-301: Construction Planning and Management

Construction challenges, key players in construction

projects, Management issues, Project management objectives, Processes and responsibilities, Project Life Cycle (PLC), Value engineering, Normal track versus Fast track construction; Planning & Scheduling, Network Techniques, Precedence diagram method (PDM), CPM Calculations, Bar Chart, Time Scaled Diagrams, Resource Leveling, Types of Costs; Management, Types of Management Creeps, S-Curve, Planning, Pre-construction, Planning, Method Statements; Project Planning, Scheduling and Controlling by Probabilistic Models; Introduction to use of computer software in project planning and management.

HS-203: Community Service.

For contents, please refer to page number 25.

CE-301: Structural Analysis-II

Statically indeterminate structures, determination of degree of instability and stability of structures, Methods of least work and consistent deformation, Slope deflection method, Moment distribution method, Analysis of continuous beams and frames, Analysis of indeterminate trusses, Application of virtual work (Unit load method) to deflection of trusses, external and internal indeterminacy; Influence Lines for Beams and Trusses, Qualitative Influence Lines by Muller-Breslau's Principle; Introduction to flexibility method, Introduction to stiffness method, Introduction to finite elements, Shape functions for bar element.

CE-302: Mechanics of Solids-II

Stress and strain analysis, Analysis of Stress and strain at a point due to combined effect of axial force, shear force and bending moment; Mohr's circle for stress and strain analysis; Theories of failure for ductile and brittle materials; Shear stress distribution in thin walled open beams; Introduction to bending and buckling of plates; Elementary theory of elasticity; Introduction to circumferential and radial stresses in curved beams; Elementary theory of plasticity; Electrical resistance strain measurements; Unsymmetrical bending of beams of symmetrical and unsymmetrical sections; Shear flow and shear center of thin walled open section beams.



CE-303: Geotechnical and Foundation Engineering

Soil Exploration; settlement analysis; soil Compaction; bearing Capacity of soils; earth pressures; stability of slopes, earth and rock fill dams; Introduction to deep foundations; Soil Dynamics; Introduction to Geotechnical Computer Software.

MT-302: Probability and Statistics

For contents, please refer to page number 150.

CE-304: Hydrology and Water Resources

Introduction to hydrology, Water resources in Pakistan, Introduction of dams and barrages, Meteorology, Precipitation, Evaporation and Transpiration, Stream Flow and Runoff, Hydrographs, Stream flow routing, Introduction to Ground Water Flow Sources, Introduction to hydrologic modeling.

HS-402: Economics

For contents, please refer to page number 28.

CE-305: Environmental Engineering-I

Introduction to the Environmental Engineering, Water survey, Principles of waste water treatment, Water pollution, Introduction to Water quality and treatment: Advance water treatment techniques; Introduction to Water supply systems; Introduction to Wastewater collection system, Wastewater treatment, Air pollution control; Solid waste management; Hazardous and industrial waste management, Water quality modeling, Noise pollution control; Layout and design of water transmission works and distribution networks (Hardy Cross and Equivalent Pipe method).

CE-306: Reinforced Concrete Design-I

Basic Properties of Cement, Concrete mix Design, Mechanics of reinforced concrete design; Introduction to Design Philosophy, Working stress method, Ultimate Strength Method; Analysis and Design of beams, slabs, columns; Serviceability, Shear Strength in beams and design of shear reinforcement; Bond in concrete and development length; Design of Short Columns; Torsion, Analysis and Design of Footings by USD Method.

CE-307: Transportation Engineering-I

Introduction to Transportation Systems and Planning, Modes of transportation, need and scope of comprehensive plan, Highway Planning, Geometric Design, Horizontal Curves. Vertical Curves; Traffic Engineering, Design Speed, Traffic Estimates, Traffic Lane, Capacity, Traffic Survey, Road Signs & Signals, Channelization; Design of Intersection at Grade & Grade Separated Intersections; Driver Characteristics; Traffic Control devices; Highway Safety; Railway Engineering.

CE-308: Steel Structures

Introduction to steel as a structural material, hot rolled, cold formed and built up sections; objectives of designer and selection design criteria; introduction to various methods of design; Fundamentals of allowable stress design, Strength analysis and design of simple tension, compression, flexural members; LRFD Method of Design,

Analysis and design of tension members, Analysis and design of columns, lacing and stay plates, welded, bolted and riveted truss connections, brackets, moment and shear connections, design and drawing of a truss, purlin, roof sheet, end bearing plate.

CE-309: Fluid Mechanics-II

Fluid flow in pipes, Reynold's number and its significance; Dimensional Analysis; Ideal and real fluid; Differential equation of continuity, Rotational and irrotational flow, Elementary Hydro-dynamics; Forces on Immersed Bodies; Forces on Vanes and Turbo machinery; Impulse momentum equation; Types of Turbines; Governing of turbines; Centrifugal Pumps.

ME-407: Health Safety and Environment

For contents, please refer to page number 63.

CE-401: Environmental Engineering-II

Introduction to Water Supply System and Water

Consumption; Introduction to Sewerage System, Sampling and Analysis of Air and Water Pollutants; Solid Waste Management; Introduction to Environmental legislation and regulations; Design criteria of water supply and water treatment; Design criteria of wastewater collection and treatment; Storm drainage, road and building drainage systems; Design criteria of solid waste collection systems, Solid waste engineering and management; Environmental Impact Assessment.

CE-402: Reinforced Concrete Design-II

Introduction to Limit State; Analysis and Design of Column Supported Slab by DDM; Analysis and Design of Walls; Introduction to design of miscellaneous Structures, Staircase and Water tanks; Design of Long Columns, Biaxial Columns, Columns subjected to Flexural and Axial Loading in Braced & un-braced frames; Design of Footings; Introduction to Seismic Design of Structural Members, Static Lateral Force Procedure Method, Base Shear, Seismic Zones, Response Modification Factor,



Load combinations, Dynamic Bearing Capacity, Seismic Detailing; Design of gravity and cantilever retaining walls; Introduction to computer aided analysis and design; Pre-stressing Principles & Design Philosophy.

CE-403: Transportation Engineering-II

Highway Engineering, Pavement and its type, Principal of Pavement Design, Two Approaches to Pavement Design, Pavement Design standards, Methods of pavement design, AASHTO pavement design method, Group index method, C.B.R. Method, Westergard method; resilient behavior of unbound granular materials; Pavement failures, construction, and maintenance; Pavement evaluation and rehabilitation; Introduction to non-destructive testing; Runway Engineering, Type & elements of Airport Planning, Factors affecting airport site selection, Effect of aircraft performance on runway Length, Various runway, configuration, Comparison of Highway and airport pavements; Introduction to Pavements for Ports and Harbors.

HS-404: Foreign Language

For contents, please refer to page number 30.

CE-405: Design of Structures

Specifications codes and Practice, ACI-318-14, ASCE-07, Pakistan Building Codes (PBC), UBC97; Choice and forms of Structures for various conditions; Drawing office Practice for preparation of detailed working drawing; Analysis design and preparation of working drawings of steel and concrete structures; Introduction to basics of earthquake resistant design.

CE-406: Hydraulics & Irrigation Engineering

Steady flow in open channels, Specific energy, Uniform Flow, Gradually varying flow, Rapidly varying flow, Unsteady Flow; Spatially Varying Flow; Dams; Hydraulics Similitude; Sediment Transport in Open Channels; Water

Power Engineering; Introduction to irrigation engineering; Canal Irrigation; Irrigation Works; Irrigated Agriculture; Irrigation methods and practice; Reservoirs; Water logging and salinity; Drainage.

CE-407: Computer Aided Design

Introduction to Finite Element Analysis; Modeling of plane frame; Modeling of portal frame; Modeling of load dependent structures where structural condition changes for different load cases; Modeling of pre-stress loading in a plane frame structure, Modeling of structures with offset connection; Concrete analysis and design of space frame structures; Flat slabs and shear wall using finite elements; Analysis and design of water retaining structures; Dynamic analysis, Analysis of space frame for seismic loads and wind, Modeling of space structures subjected to moving loads; Analysis of bridge with moving loads; Beam and slabs on elastic foundations; Wall resisting hydrostatic pressures.

HS-408: Hazards and Disaster Management

Introduction to Hazards and Disasters; Social & Economic Aspects of Natural and human induced hazards; Hazard and Disaster Investigation; Disaster Management, Pre-Disaster Phase, Disaster Phase, Post-Disaster Phase; Damage assessment, management policies and institutional infrastructure from national to local level, Monitoring of Infra-structure facilities; strategies for protection against possible damages, maintenance for different infrastructure facilities; Rehabilitation and repair strategies; Awareness Programs, Follow-on Disasters; Recovery plans, Strategies for protection, Risk and Vulnerability Analysis, Disaster Mitigation.

Laboratories

Students are provided with the opportunity of augmenting their theoretical learning through practical work in the state-of-the-art laboratories. These labs are fully equipped, adaptable, reconfigurable, and modular; making them ideally suited for conducting lab experiments designed in coherence with theory, and undertaking research in the fields of Structures, Transportation, Water Resources, Geotechnical Engineering, Environmental Engineering, Construction Engineering & management etc.

The Department of Civil Engineering has following well maintained dedicated laboratories for the subject program:

Surveying Lab:

The Surveying Laboratory is fully equipped with the classical and state-of-the-art equipment relevant to the theoretical knowledge taught in couple of surveying courses. The advanced equipment includes electronic total station, electronic digital theodolite, automatic level, a tripod-mounted laser level, walkie talkie sets for communication, and Global Positioning System units; while the traditional equipment consists of measuring chains, measuring tapes, measuring wheels, prismatic compass sets, and plane table sets for field applications of triangulation, traversing, curve layout and chain surveying techniques.

Concrete Technology Lab:

Concrete being the most widely used Civil Engineering material in modern era, makes Concrete Technology Laboratory as one of integral laboratory requirement for department of Civil Engineering. It has been equipped with Digi-Max smart line semi-automatic compression and flexural testing machine, core drilling machine, Vicat apparatus, le-chatlier's apparatus, compacting factor apparatus, slump test apparatus, electric motorized concrete and mortar mixers, electric vibrating table, poker concrete vibrator, digital Los Angeles machine for aggregate abrasion, standard sieves and sieve shaker set, cylindrical, cubicle and beam molds etc. The laboratory is also facilitated with the adjacent 'curing and storage room' provided for the purpose of storage of constituent materials and curing of concrete specimens

as per standard specification procedure. This laboratory satisfies the requirements of three courses, 'Engineering Materials', 'Reinforced Concrete Design-I' and 'Reinforced Concrete Design-II' as per approved scheme of study.

Geo-Technical Engineering Lab:

The Geotechnical Engineering Laboratory is purposed to practically apply the basic theoretical concepts regarding the behavior of soil and its interaction with other structural materials. The Laboratory has been equipped with Atterberg limit apparatus, specific gravity apparatus, standard sieves and sieve shaker set, Standard and Modified Proctor test apparatus, soil permeameters, Hydrometer test apparatus, Speedy Moisture tester and Laboratory Ovens. This laboratory satisfies the requirements of two courses, 'Soil mechanics' and 'Geo-technical and Foundation Engineering' as per approved scheme of study.

Fluid Mechanics Lab:

The practical understanding of basic concepts of fluid flow is mandatory for analyzing the behavior of hydraulic structures such as dams and barrages. In order to fulfill this requirement, fluid mechanics laboratory has been established and equipped with Bernoulli's theorem apparatus, Drag Coefficient apparatus, hydraulic bench apparatus, Hydrostatic pressure apparatus, Metacentric Height Apparatus, Flow over weirs apparatus, Dead Weight tester, Viscometer, Orifice Meter etc. This laboratory will satisfy the requirements of two courses, 'Fluid Mechanics-I' and 'Fluid Mechanics-II' as per approved scheme of study upon completion of ongoing procurement process.

Mechanics of Solids Lab:

Demonstrating the basic principles of mechanics of structural materials at the undergraduate level through a series of experiments is the objective of the mechanics of solids lab. Computer controlled electro hydraulic Universal Testing Machine (UTM) is one of the major equipment installed in Mechanics of Solids Lab. The laboratory has also been equipped with verification of concurrent force

system apparatus, Beam deflection apparatus, Varignon's apparatus, Center of gravity apparatus, Forces in Jib and crane apparatus, three wire suspension apparatus, forces on inclined plane apparatus and Impact testing machine etc. This laboratory will satisfy the requirements of three courses, 'Engineering Mechanics', 'Mechanics of solids-I' and 'Mechanics of solids-II' as per approved scheme of study upon completion of ongoing procurement process.

Transportation Engineering Lab:

Transportation Engineering Laboratory will provide a platform to undergraduate students to practically apply the theoretical concepts gained in the area of highway engineering, pavement materials and traffic engineering. This laboratory will satisfy the requirements of 'Transportation Engineering-II' as per approved scheme of study upon completion of ongoing procurement process.

Environmental Engineering Lab:

Environmental Engineering Laboratory will provide a platform to undergraduate students to apply the theoretical concepts related to water quality assessment, air, solid waste and wastewater treatment. This laboratory will satisfy the requirements of 'Environmental Engineering-I' as per approved scheme of study upon completion of ongoing procurement process.

Hydraulics Lab:

The Hydraulic Laboratory applies hydraulic modeling and analysis, and will give undergraduates expertise in solution of water resources, hydraulics, and fluid mechanics problems. This laboratory will satisfy the requirement of two courses, 'Hydraulics & Irrigation Engineering' and 'Hydrology & Water Resources' as per approved scheme of study upon completion of ongoing procurement process.



Department of Computer Science



Dr. Junaid Ali Khan
Chairman

The Department of Computer Science and Engineering was established in Spring 2014 and is re-designated as Department of Computer Science (DCS) on the instructions of Punjab Higher Education Commission Pakistan in July 2019. The Department aims to impart quality education to its students. The Department not only emphasizes on technical and practical skills of the students but also endeavors to enhance their sense of responsibility towards humanity. The Department has employed highly qualified, most experienced, research-focused and professionally sound faculty for its different academic programs. Dedicated, spacious and well-equipped laboratories have been established for providing state-of-the-art research, development, teaching and learning facilities. The curriculum of each program meets requirements of the industry and is in-line with the criteria set by Higher Education Commission of Pakistan and National Computing Education Accreditation Council.

The Bachelor of Science in Computer Science (BS CS) program has been designed to produce professionals having sound computing knowledge, complex problem solving capabilities, critical thinking towards problem design and analysis. The curriculum of BS CS broadly covers the four streams of computer science like computing, artificial intelligence, data science and information security. The curriculum and the laboratory work has been designed and integrated in such a way that our graduates get edge over their competitors for securing better positions in the industry,

academia and research within the country and abroad. After completing the BSCS program, our students will have a thorough understanding of the latest computing tools, theoretical and practical aspects of the subject area.

Software Engineering is the application of a systematic, disciplined and quantifiable approach to the design, development, operation, and maintenance of software systems. The Bachelor of Science in Software Engineering (BS SE) program has been designed to prepare software engineers, fully capable of effectively applying emerging software engineering knowledge to meet future challenges of the world. It is in fact the practice of designing and implementing large, reliable, efficient and economical software by applying the principles and practices of engineering. The department aims to train students in all aspects of software life cycle from specification through analysis and design to testing, maintenance and evolution of software product. Our graduates will play pivotal role as a multi-disciplinary team member in the national and international market in connection with automation, design, research and development.

In Fall 2014, the Department started MS Computer Science with the aim to broaden the knowledge of computing and bridge the gap between graduate level knowledge and the cutting-edge research methodologies and technologies. The MS program is designed to enable students to learn advanced knowledge in the domain of computer science by taking specialized courses to enhance their expertise in the latest areas.

In Spring 2019, the DCS has also started PhD in Computer Science. It is a full-time study program to facilitate the students to engage themselves in the advanced study and research. PhD scholars will be capable of integrating their professional education and experience to solve practical complex problems through innovative approaches.

Besides academics, we also focus on personality development and character building of our students by facilitating them to get involved in extracurricular activities within and outside the HITEC University. We strongly hope that our students will become innovators and leaders with regards to their contribution. I look forward to seeing you in my department where you can study to build an exciting career in one of the most promising academic programs of this era.

Faculty

Dr. Junaid Ali Khan (HEC Approved Supervisor)

Designation: Associate Professor, Chairman & Director ORIC
Qualification: PhD, International Islamic University, Islamabad, Pakistan
Area of Interest: Artificial Intelligence, Cognitive Computation, Neural Networks Modeling
E-mail: junaid.ali@hitecuni.edu.pk

Dr. Junaid Tariq (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD, City University of Hong Kong, Hong Kong
Area of Interest: Video Coding
E-mail: junaid.tariq@hitecuni.edu.pk

Dr. Abdullah (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD, University of Malaya, Malaysia
Area of Interest: Cloud computing, Mobile computing, Blockchain technology, and Internet of things
E-mail: abdullah.yousafzai@hitecuni.edu.pk

Dr. Muhammad Nazir

Designation: Assistant Professor
Qualification: PhD, Islamia College Peshawar, Pakistan
Area of Interest: Artificial Intelligence and Digital Image Processing
E-mail: muhammad.nazir@hitecuni.edu.pk

Mr. Waqar Ismail

Designation: Lecturer
Qualification: MS(Computer Science), UET Taxila, Pakistan. PhD (In Progress)
Area of Interest: Image Processing, Machine Learning, Artificial Intelligence, Pattern Recognition, Medical Imaging, Agro Robotics, Video Surveillance.
E-mail: waqar.ismail@hitecuni.edu.pk

Mr. Muhammad Attique Khan

Designation: Lecturer
Qualification: MS(Computer Science), COMSATS Wah
Area of Interest: Surveillance, Pattern Recognition, Machine Learning, Biometrics, Medical Imaging, Agricultural Plants
E-mail: attique.khan@hitecuni.edu.pk

Mr. Shahzad Arif

Designation: Lecturer
Qualification: MS(Computer Science), UET Taxila, Pakistan.
Area of Interest: Computer Network, Cloud Computing.
Email: shahzad.arif@hitecuni.edu.pk

Mr. Nouman Noor

Designation: Lecturer
Qualification: MS(Computer Science), Bahria University Islamabad, Pakistan
Area of Interest: Data Sciences, Machine Learning.
Email: nouman.noor@hitecuni.edu.pk

Mr. Inzamam Mashood Nasir

Designation: Lecturer
Qualification: MS(Computer Science), COMSATS University Islamabad, Wah Campus.
PhD (In Progress)
Area of Interest: Web Design and Development, Databases, Blockchain.
Email: inzamam.mashood@hitecuni.edu.pk

Ms. Ifrah Jameel Bajwa

Designation: Lecturer
Qualification: MS (English Linguistics), Fatima Jinnah Women University, Rawalpindi.
Area of Interest: English Literature, Linguistics
Email: ifrah_bajwa@yahoo.com

Ms. Maria Azmat

Designation: Lab Demonstrator
Qualification: BS (Computer Science), Government College University, Faisalabad.
Area of Interest: Digital Image Processing, Database Management.
Email: maria.azmat@hitecuni.edu.pk

Mr. Adnan Javed

Designation: Lab Demonstrator
Qualification: BS (Computer Science), Arid Agriculture University, Rawalpindi, Pakistan
Area of Interest: Web Development, Database Management.
Email: adnan.javed@hitecuni.edu.pk

BS Computer Science

The BS Computer Science program at HITEC University endeavors to produce computer scientists and highly skilled programmers, who can play a productive role in software industry, research and the academia. The program comprises of eight semesters (four years) and covers essential courses in the field of computer science. Additional elective courses are also offered to develop in-depth knowledge in the specialized areas. During the last two semesters, every student is required to take six credit hours' final year project with the aim to undertake practical industrial problems by utilizing the knowledge and skills acquired during the course of study planned in different semesters of the program. The guidelines given by Higher Education Commission of Pakistan have been followed while preparing BSCS curriculum.

Besides the foundation courses, core computer science courses such as distributed computing, machine learning, artificial intelligence, mobile application development, software engineering, digital image processing, software development, data mining, database systems etc., are also offered to provide required depth in the specialized areas. In addition, a number of courses from other disciplines are taught to bridge the gap. Courses related to social sciences, management and humanities are included in the curriculum for character-building and personality grooming of our students.

The BS Computer Science program is accredited by National Computing Education Accreditation Council (NCEAC). The laboratory work is supervised by the concerned faculty member and qualified lab demonstrator. The lab sessions are conducted in the well-established and spacious labs which house state-of-the-art equipment. Internet facility is available throughout the campus, twenty-four hours a day and seven days a week for the benefit of the students and faculty. Highly qualified and experienced full-time dedicated faculty members are available for quality teaching. These labs enable our students to develop skills which will help them secure jobs both nationally and internationally. The semester-wise breakdown of BS Computer Science curriculum is appended as follows: -

Curriculum

Semester-1

| Course Code | Course Title | Credit Hours |
|----------------------------|--|--------------|
| CS-101 | Introduction to Information and Communication Technologies | 2+1 |
| CS-102 | Programming Fundamentals | 3+1 |
| CS-103 | Discrete Structures | 3+0 |
| HS-101 | English | 3+0 |
| IS-211 | Islamic Studies | 2+0 |
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| Total Credit Hours: | | 18 |

Semester-2

| Course Code | Course Title | Credit Hours |
|----------------------------|-----------------------------|--------------|
| MT-203 | Linear Algebra | 3+0 |
| HS-102 | Pakistan Studies | 2+0 |
| HS-103 | Communication Skills | 3+0 |
| CS-104 | Object Oriented Programming | 3+1 |
| EE-207 | Introduction to Electronics | 2+1 |
| EC-121 | Digital Logic Design | 3+1 |
| Total Credit Hours: | | 19 |

Semester-3

| Course Code | Course Title | Credit Hours |
|----------------------------|---------------------------------|--------------|
| MT-103 | Differential Equations | 3+0 |
| HS-403 | Management and Entrepreneurship | 3+0 |
| CS-201 | Data Structures and Algorithms | 3+1 |
| CS-204 | Software Engineering | 3+0 |
| HS-401 | Professional values and Ethics | 2+0 |
| HS-201 | Technical Report Writing | 3+0 |
| HS-203 | Community Service | 0+1 (NC) |
| Total Credit Hours: | | 18 |

Semester-4

| Course Code | Course Title | Credit Hours |
|----------------------------|--|--------------|
| CS-203 | Design & Analysis of Algorithms | 3+0 |
| CS-205 | Computer Architecture and Organization | 3+0 |
| MT-204 | Multivariable Calculus | 3+0 |
| HS-302 | International Relations | 3+0 |
| CS-202 | Microprocessor and Assembly Language | 2+1 |
| HS-402 | Economics | 2+0 |
| Total Credit Hours: | | 17 |

Semester-5

| Course Code | Course Title | Credit Hours |
|----------------------------|-------------------------------|--------------|
| CS-301 | Theory of Automata | 3+0 |
| CS-303 | Operating Systems | 3+1 |
| CS-304 | Database Systems | 3+1 |
| CS-3XX | Computer Science Elective - I | 2+1 |
| MT-302 | Probability and Statistics | 3+0 |
| Total Credit Hours: | | 17 |

Semester-6

| Course Code | Course Title | Credit Hours |
|----------------------------|--|--------------|
| CS-302 | Artificial Intelligence | 2+1 |
| CS-306 | Data Communication and Computer Networks | 2+1 |
| CS-307 | Visual Programming | 3+1 |
| CS-308 | Software Quality Assurance | 3+0 |
| CS-3XX | Computer Science Elective - II | 2+1 |
| ACC-201 | Financial Management | 3+0 |
| Total Credit Hours: | | 19 |

Semester-7

| Course Code | Course Title | Credit Hours |
|----------------------------|---------------------------------|--------------|
| CS-401 | Compiler Construction | 2+1 |
| CS-4XX | Computer Science Elective - III | 2+1 |
| CS-4XX | Computer Science Elective - IV | 3+0 |
| CS-408 | Human Computer Interaction | 2+1 |
| HS-404 | Foreign Language | 1+1 |
| CS-499 | Final Year Project | 0+3 |
| Total Credit Hours: | | 17 |

Semester-8

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------------------------|--------------|
| CS-402 | Information Security | 3+0 |
| CS-405 | Numerical Computing | 2+1 |
| CS-4XX | Computer Science Elective - V | 2+1 |
| CS-4XX | Computer Science Elective - VI | 3+0 |
| ME-407 | Health Safety and Environment | 1+0 |
| CS-499 | Final Year Project | 0+3 |
| Total Credit Hours: | | 16 |



List of Computer Science Elective Courses

Information Security Stream

| Course Code | Course Title | Credit Hours |
|-------------|--|--------------|
| CS-310 | Distributed Computing | 3+0 |
| CS-404 | Data and Network Security | 3+0 |
| CS-406 | Digital Image Processing | 2+1 |
| CS-419 | Introduction to Optimization Techniques | 3+0 |
| CS-420 | System Loss Prevention Methodologies | 3+0 |
| CS-421 | Security Threats and Risk Assessment | 3+0 |
| CS-422 | Information System Forensics and Investigation | 2+1 |
| CS-423 | Network & Distributed Systems Security | 3+0 |
| CS-424 | Introduction to Cryptography | 2+1 |
| CS-425 | Wireless Network Security | 2+1 |
| CS-426 | Computer Security | 2+1 |
| CS-427 | Cyber Forensic Analysis | 3+0 |

Computing Stream

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| CS-305 | Computer Graphics | 2+1 |
| CS-309 | Web Design and Development | 2+1 |
| CS-310 | Distributed Computing | 3+0 |
| CS-312 | Web Engineering | 2+1 |
| CS-313 | Formal Methods in Software Engineering | 3+0 |
| CS-314 | Social Computing | 3+0 |
| CS-403 | Mobile Application & Development | 3+0 |
| CS-406 | Digital Image Processing | 2+1 |
| CS-407 | Fundamentals of Data Mining | 3+0 |
| CS-418 | Logical Paradigm of Computing | 3+0 |
| CS-419 | Introduction to Optimization Techniques | 3+0 |
| CS-428 | Introduction to Machine Learning | 2+1 |

Artificial Intelligence Stream

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| CS-305 | Computer Graphics | 2+1 |
| CS-407 | Fundamentals of Data Mining | 3+0 |
| CS-410 | Artificial Neural Networks | 2+1 |
| CS-412 | Expert Systems | 3+0 |
| CS-413 | Fuzzy Logic Systems | 2+1 |
| CS-414 | Computational Intelligence | 3+0 |
| CS-415 | Multi Agent Systems | 3+0 |
| CS-416 | Natural Language Processing | 3+0 |
| CS-417 | Game Development | 3+0 |
| CS-419 | Introduction to Optimization Techniques | 3+0 |
| CS-428 | Introduction to Machine Learning | 2+1 |
| CS-433 | Deep Learning and Applications | 2+1 |

Data Science Stream

| Course Code | Course Title | Credit Hours |
|-------------|----------------------------------|--------------|
| CS-305 | Computer Graphics | 2+1 |
| CS-310 | Distributed Computing | 3+0 |
| CS-311 | Data Warehousing | 3+0 |
| CS-406 | Digital Image Processing | 2+1 |
| CS-411 | Computer Vision | 3+0 |
| CS-428 | Introduction to Machine Learning | 2+1 |
| CS-429 | Introduction to Data Science | 2+1 |
| CS-430 | Data Science and Engineering | 3+0 |
| CS-431 | Big Data Programming | 2+1 |
| CS-432 | Introduction to Big Data Mining | 3+0 |
| CS-433 | Deep Learning and Applications | 2+1 |
| CS-434 | Data Visualization | 2+1 |

Course Contents

CS-101: Introduction to Information and Communication Technologies

Basic definitions and concepts, hardware: computer systems and components. Storage devices, number systems, software: operating systems, programming and application software, introduction to programming, databases and information systems, networks, data communication, the Internet, browsers and search engines, email, collaborative computing and social networking, e-commerce, IT security and other issues.

HS-101: English

For contents, please refer to page number 24.

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 149.

CS-102: Programming Fundamentals

This course covers principles of structured and modular programming, overview of structured programming languages, algorithms and problem solving, program development: analyzing problem, designing algorithms, testing designed solutions, translating algorithms into programs, fundamental programming constructs, data types, basics of input and output, selection and decision (if, if-else, nested if-else, switch statement and condition operator), repetition (while and for loop, do-while loops), break statement, continue statement, control structures, functions, arrays, pointers, records, Files (input-output), testing & debugging.



HS-102: Pakistan Studies

For contents, please refer to page number 173.

MT-203: Linear Algebra

For contents, please refer to page number 150.

CS-103: Discrete Structures

Mathematical reasoning: introduction to logic, propositional and predicate calculus, negation disjunction and conjunction, implication and equivalence, truth tables, predicates, quantifiers, natural deduction, rules of inference, methods of proofs, use in program proving, resolution principle, set theory, paradoxes in set theory, inductive definition of sets and proof by induction, relations, representation of relations by graphs, properties of relations, equivalence relations and partitions, partial orderings, linear and well-ordered sets, functions: mappings, injection and surjection, composition of functions, inverse functions, special functions, peano postulates, recursive 20 function theory, elementary combinatorics, counting techniques, recurrence relation, generating functions. Graph theory: elements of graph theory, planar graphs, graph coloring, Euler graph, Hamiltonian path, trees and their applications.

HS-103: Communication Skills

For contents, please refer to page number 24.

MT-103: Differential Equations

For contents, please refer to page number 149.

CS-104: Object Oriented Programming

Evolution of object oriented programming (OOP), object oriented concepts and principles, problem solving in object oriented paradigm, OOP design process, classes, functions/methods, objects and encapsulation, constructors and destructors, operator and function/method overloading, association, aggregation, composition, generalization, inheritance and its types,

derived classes, function/method overriding, abstract and concrete classes, virtual functions, polymorphism, exception handling, files and streams.

ACC -201: Financial Management

Meaning & scope of financial management, financial manager & financial environment, time value of money, corporate financial statement analysis / ratios, financial forecasting & financial planning, analysis of cash flows, bond, securities & their valuation, budgeting & evaluation, the basis of capital, introduction to working capital management & managing current assets, working capital financing / financing current assets, strategic financial decisions-basics, risk & return, analysis of inventories, cash flow estimation and other topics in capital budgeting.

CS-201: Data Structures and Algorithms

Introduction to data structures and algorithms, complexity analysis, arrays, sorting algorithms, insertion sort, selection sort, bubble sort, shell sort, heap sort, quick sort, merge sort, radix sort, bucket sort, linked lists, singly linked lists, doubly linked lists, circular list, stacks, queues, and priority queue, Recursion: Function call and recursion implementation, nested recursion, backtracking. Trees: binary trees, binary heap, binary search, tree traversal, insertion, deletion, and balancing a tree, heap, B-Tree, Spanning tree, AVL trees, graphs: representation, traversal, shortest path, and cycle detection, isomorphic graphs, graph traversal algorithms, hashing and memory management.

HS -302: International Relations

For contents, please refer to page number 173.

EE -207: Introduction to Electronics

Introduction to semiconductor materials, theory of semiconductor diodes, forward and reverse biasing diode, diode equivalent circuit, PN junction diode, ideal and practical diode concepts, diode as a switch, rectification, clippers, clamper, voltage regulators, voltage multipliers,

bipolar junction transistors (BJTs), static characteristics.

HS -201: Technical Report Writing

For contents, please refer to page number 25.

HS-203: Community Service.

For contents, please refer to page number 25.

CS -202: Microprocessor and Assembly Language

Microprocessor bus structure: addressing, data and control, introduction to registers and flags, addressing modes, instruction sets including data movement, arithmetic and logic, program control, stack and its operation, peripheral control interrupts, introduction to assembler and debugger, manipulation and translation of machine and assembly code, describing actions inside the processing chip.

CS-203: Design & Analysis of Algorithms

Introduction, asymptotic notations, recursion and recurrence relations, divide-and-conquer approach, sorting, search trees, heaps, hashing, greedy approach, dynamic programming, polynomial and matrix calculations, graph algorithms, shortest paths, network flow, disjoint sets, string matching, NP complete problems, approximation algorithms.

EC-121: Digital Logic Design

For contents, please refer to page number 77.

CS-204: Software Engineering

Overview of SE, practice & myths, the software processes, generic process models: framework activity, task set, process patterns, process improvement, CMM prescriptive, process models: waterfall model, incremental process model, evolutionary process model, specialized process models: component based development, the formal methods models, agile development, business

information systems: components, types, and evaluating methods. SDLC: phases, system planning, preliminary investigation, SWOT analysis. The importance of strategic planning, evaluation of systems requests, requirements engineering. Difference between structured analysis and object oriented analysis, difference between FDD diagrams & UML diagrams, data & process modeling, diagrams: data flow, context, conventions, detailed level DFD's, leveling and balancing, logical versus physical models. The design process, architecture design elements, interface design elements, component-level design elements, deployments design elements, system architecture, architectural styles, user interface design, web apps interface design, software quality assurance, validation testing, system testing, internal and external view of testing, project management, risk management, maintenance and reengineering.

MT-204: Multivariable Calculus

For contents, please refer to page number 149.

CS-205: Computer Architecture and Organization

Difference between architecture & organization, design of computer systems and components, processor design, CPU architecture, functional blocks and development of instruction set, design of basic functional blocks, instruction set design, and addressing, control structures and microprogramming, memory management, caches, and memory hierarchies, and interrupts and I/O structures, pipelining of processor issues and hurdles, exception handling, parallelism, multiprocessor systems, introduction to superscalar processors (CISC, RISC), cache memory, different designs of cache memory system, virtual memory system, address mapping using pages, pipelining and threading, instruction level parallelism (ILP), introduction to parallel processing, branch prediction, pre-fetching, multithreading.



IS-211: Islamic Studies

For contents, please refer to page number 172.

CS-301: Theory of Automata

Finite state models: language definitions preliminaries, regular expressions/regular languages, Finite automata (FAs), transition graphs (TGs), NFAs, Kleene's theorem, transducers (automata with output), pumping lemma and non-regular language grammars and PDA: context free grammars, derivations, derivation trees and ambiguity, simplifying CFLs, normal form grammars and parsing, decidability, context sensitive languages, grammars and linear bounded automata (LBA), Chomsky's hierarchy of grammars, turing machines theory: turing machines, Post machine, variations on TM, TM encoding, universal turing machine, defining computers by TMs.

CS-302: Artificial Intelligence

Introduction, intelligent agents, solving problems by searching, informed search and exploration, constraint satisfaction problems, adversarial search, logical agents, first-order logic, inference in first-order logic, knowledge representation, planning and acting in the real world, uncertainty, probabilistic reasoning, probabilistic learning

methods, reinforcement learning, probabilistic language processing, perception and robotics, introduction to LISP/PYTHON and expert systems (ES) and applications

MT-302: Probability and Statistics

For contents, refer to page number 150.

CS-303: Operating Systems

Evolution of operating systems, different types of operating systems, computing environment, computer system operation, I/O and storage structure, hardware protection, system architecture, system components, services, system calls & programs, virtual machines, systems design and implementation, process scheduling, operations on processes, inter-process communication, client-server systems, threads & threading models, thread types & issues, threads on popular operating systems, CPU scheduling, criteria and algorithms, real-time scheduling and solution, critical-section problem, synchronization, critical-section resolution methods, deadlock characterization, handling of deadlocks, deadlock prevention, detection & recovery, address binding for memory management, swapping, memory allocation, paging, segmentation, virtual memory, file system concept, access methods & protection.

CS-304: Database Systems

Basic database concepts, database architecture, DB design life cycle, schema architecture, conceptual, logical and physical database modeling and design, entity relationship diagram (ERD), enhanced ERD, relational data model, mapping ERD to relational model, functional dependencies and normalization, relational algebra, structured query language (SQL), transaction processing, concurrency control and recovery techniques, query optimization concepts.

CS-305: Computer Graphics

Graphics hardware, fundamental algorithms, applications

of graphics, interactive graphics programming, graph plotting, windows and clipping, and segmentation. Programming raster display systems, differential line algorithm, panning and zooming. Raster algorithms and software scan- converting lines, characters and circles. Scaling, rotation, translation, region filling and clipping. Two and three dimensional imaging geometry (perspective projection and orthogonal projection) and transformations. Curve and surface design, rendering, shading, color and animation.

CS-306: Data Communication and Computer Networks

Data communication concepts, analogue and digital transmission, noise, media, encoding, asynchronous and synchronous transmission, network system architectures (OSI, TCP/IP), error control, flow control, data link protocols, bridging. Local area networks and MAC layer protocols, multiplexing, switched and IP networks, internetworking, routing, transport layer protocols TCP, UDP and SCTP, application layer protocols, wireless LANs.

CS-307: Visual Programming

Introduction to Windows programming, Use of Windows API, MFC class hierarchy, class wizard, application wizard and application studio, graphics device interface, menus, document view architecture, multiple views, files and achieving mechanisms, converting windows programs to MFC, subclassing controls, Windows forms programming, advanced topics in C#, collections, generics, socket programming and database connection with visual applications.

CS-308: Software Quality Assurance

What is software quality: quality assurance, quality engineering software testing: testing: concepts, issues, and techniques, test activities, management, and automation, coverage and usage testing based on checklists and partitions, input domain partitioning and boundary testing, coverage and usage testing based

on finite-state machines and Markov chains, control flow, data dependency, and interaction testing, testing techniques: adaptation, specialization, and integration. quality assurance beyond testing: defect prevention and process improvement, software inspection, Formal verification, Fault Tolerance and Failure Containment, Comparing Quality assurance techniques and activities, quantifiable quality improvement: feedback loop and activities for quantifiable quality improvement, quality models and measurements, defect classification and analysis risk identification for quantifiable quality improvement, software reliability engineering.

CS-309: Web Design and Development

Introduction to the web structure, layers of the Internet, domain name service, uniform resource locator, overview of web applications, history of markup language. HTML, CSS, box Model, clients side scripting, server side scripting, Review of current web related frameworks e.g. Bootstrap, jQuery, jQuery mobile, Ajax, Wordpress, Joomla, dynamic website development. Introduction to current technologies e.g. MySQL, PHP, ASP, ASP.Net. Introduction to related methods and tools e.g., website hosting, database connectivity, dream weaver, cursory view of web analytics and search engine optimization (SEO).

CS-310: Distributed Computing

Introduction to parallel and distributed systems, software architectures: threads and shared memory, processes and message passing, distributed shared memory (DSM), distributed shared data (DSD). system models, networking and internetworking, communication models and abstractions (message passing, stream oriented communications, remote procedure calls, remote method invocation), naming in distributed systems, concurrency and synchronization, process synchronization, distributed transaction and concurrency control, distributed data replication, security and access control, overview of web services, cloud computing.

CS-311: Data Warehousing

Introduction of the business context for data warehousing and decision support systems, TPS vs. DSS environments. Data extraction, transformation and loading (ETL and ELT), data warehouse architecture, data marts, data warehouse design methodology: de-normalization and dimensional modelling, online analytical processing (OLAP) and data aggregations, indexing techniques, hardware and software systems consideration for data warehousing, data warehouse maintenance.

CS-312: Web Engineering

Requirements of engineering for web applications, web applications modeling, web application architectures, technology-away web application design, technologies for web applications, testing web applications, operation and maintenance of web application, web project management, web application development process, usability of web applications, performance of web applications, security for web applications, review of semantic web.

CS-313: Formal Methods in Software Engineering

Introduction to formal methods, developing and acquiring formal methods, using and applying formal methods, a brief introduction to logic and set theory, Introduction to Hoare's Logic, logic and theorem proving, modeling software systems, sequential, concurrent and reactive systems, states, state spaces, transition systems, combining state spaces, fairness, partial order view, modeling formalism, Formal Specifications Linear temporal logic, automata on infinite words, specifications using Buchi-automata, completeness of specification, Automatic verification, state space verification, representing states, the automata framework, combining Buchi -automata, checking emptiness, translating LTL into automata, model checking examples, checking complexity of model checking, safety properties, state space explosion problem, Z-Specification, structure and schema.



CS-314: Social Computing

Latest research and development activities in social networking e.g., service architectures for social networks, common APIs for popular architectures (Facebook, open social, etc.), open ID and shibboleth, linked data for social networks (FOAF, SKOS, etc), social network properties and analysis methodologies, social network interoperability, social network topologies and ecosystems, social networks in e-learning, enterprise and media, Identity, privacy and ownership in social networks, aspects of recommendation engines and information retrieval in social networks, sentiment classification, opinion extraction, social knowledge acquisition, social group identification and clustering, outlier detection.

CS-401: Compiler Construction

Introduction to compilers, recursive descent parsing, demo compiler overview, lexical analysis using tokenizing, parsing including LL(1) grammars, shift-reduce (LR) parsing, Intermediate code generation and type checking, scope and code generation, the java virtual machine,

basic blocks, flow graphs and simple code optimization, basic blocks as DAGs, peephole optimization, and graph coloring, Ershov numbers and data-flow analysis, The GNU compiler collection, compilers and security, how to build a compiler?

HS-401: Professional Values and Ethics

For contents, please refer to page number 173.

CS-402: Information Security

Basic notions of confidentiality, integrity, availability, authentication models, protection models, security kernels, encryption, hashing and digital signatures, audit, intrusion detection and response, database security, host-based and network-based security issues operational security issues, physical security issues, personnel security, policy formation and enforcement, access controls, information flow, legal and social issues, identification and authentication in local and distributed systems, classification and trust modeling, risk assessment.

HS-402: Economics

For contents, please refer to page number 28.

HS-403: Management and Entrepreneurship

For contents, please refer to page number 29.

CS-403: Mobile Application and Development

Mobile development concepts, activities, resource management and media, services and content providers, data storage, security, managing evolution, tablets graphics speech sensors networking, processes and threads, factors in developing mobile applications, HTML5 for mobiles, frameworks, user-interface, resource management, content providers, text-to-speech techniques, intents and services, storing and retrieving data, communications via network and the web, telephony, notifications and alarms, graphics, multimedia, location, hardware sensors, developers and app store license agreements, processes and threads, security and hacking, platforms issues.

CS-404: Data and Network Security

Introduction, cryptology and simple cryptosystems, conventional encryption techniques, stream and block ciphers, DES, more on block ciphers, the advanced encryption standard, confidentiality & message authentication: hash functions, number theory and algorithm complexity, public key encryption, RSA and discrete logarithms, elliptic curves, digital signatures, key management schemes, identification schemes, dial-up security, e-mail security, PGP, S-MIME, Kerberos and directory authentication, emerging Internet security standards, SET, SSL and IPsec, VPNs, firewalls, viruses, miscellaneous topics.

HS-404: Foreign Language

For contents, please refer to page number 30.

CS-405: Numerical Computing

The concepts of efficiency, reliability and accuracy of a method, minimizing computational errors, theory of differences, difference operators, difference tables, forward differences, backward differences and central differences. Mathematical preliminaries, solution of equations in one variable, interpolation and polynomial approximation,

numerical differentiation and numerical integration, initial value problems for ordinary differential equations, direct methods for solving linear systems, iterative techniques in matrix algebra, solution of non-linear equations using the methods and rules: Fixed point method, Regula-Falsi method, Newton Raphson's method, Bisection method, Lagrange Polynomial, Do Little method, Crout's method, Jacobi method, Simpson rule, Trapezoidal rule, Secant method.

CS-406: Digital Image Processing

Digital image fundamentals, elements of digital image processing, image model, binary and gray scale image, sampling and quantization, relationships between pixels and intensity level, image enhancement: enhancement by point processing, spatial filtering, enhancement in the frequency domain, discrete Fourier transform, color image processing, image segmentation, morphological image processing, image restoration, wavelets & multi-resolution processing, image compression.

CS-407: Fundamentals of Data Mining

Concepts of data mining, data pre-processing and pre-mining, (noisy and missing data, data normalization and discretization), outlier detection, data mining learning methods, data mining classes (association rule mining, clustering, classification), fundamental of other algorithms related to data mining (fuzzy logic, genetic algorithm and neural network), decision trees, rules, patterns and trends.

ME-407: Health Safety and Environment

For contents, please refer to page number 63.

CS-408: Human Computer Interaction

Human capabilities, computer and interaction, usability paradigms, interaction design basics, graphics, multimedia, cognitive psychology, industrial design, HCI in the software process, design rules, universal design, implementation tools, evaluation, user support, cognitive models, socio-organizational issues and stakeholder requirements, analyzing tasks, dialog notations and design, groupware and computer-supported collaborative Work.

CS-410: Artificial Neural Networks

Introduction, learning processes, single & multi-layer perceptron, radial basis function networks, support vector and committee machines, principal component analysis (PCA), self-organizing maps (SOMs), recurrent temporal feed-forward Networks, neural networks for optimization problems, solving matrix algebra problems using ANNs, solving linear algebraic equations using ANNs, statistical methods using ANNs, neuro-fuzzy computing, neuro-genetic computing, neuro dynamics & dynamically driven recurrent nets.

CS-411: Computer Vision

Concepts behind computer based recognition and extraction of features from raster images, applications of vision systems and their limitations, overview of early, intermediate and high level vision, Segmentation: region splitting and merging, quadtree structures for segmentation, mean and variance pyramids, computing the first and second derivatives of images using the Sobel and Laplacian operators, grouping edge points



into straight lines by means of the Hough transform, limitations of the Hough transform, parameterization of conic sections. Perceptual grouping: failure of the Hough transform, perceptual criteria, improved Hough transform with perceptual features, grouping line segments into curves, 3D vision, triangulation principle, and stereoscopy.

CS-412: Expert Systems

Introduction, history of knowledge-based expert systems, characteristics of current expert systems, expert systems building, architecture of expert systems, constructing an expert system, tools for building expert systems, rule-based expert systems, building a small rule-based expert system, advance expert system programming techniques, evaluating an expert system, reasoning about reasoning, issues and case studies, intelligent distributed problem solving.

CS-413: Fuzzy Logic System

Mathematical introduction of fuzzy sets and fuzzy logic, study of the fundamentals of fuzzy sets, operations on these sets, and their geometrical interpretations, methodologies to design fuzzy models and feedback controllers for dynamical systems, fundamental concepts of dynamical systems, multi-input multi-output dynamical systems, stability, feedback-control design, and MATLAB control system toolbox, fuzzy systems and properties, fuzzifier and de-fuzzifier design, design of fuzzy systems, fuzzy controllers, hardware and software based design of fuzzy logic control system.

CS-414: Computational Intelligence

Introduction to computational intelligence, neural networks, biological model, information flow in neural cell, artificial neural functions, single and multi-layer perceptrons, recurrent neural networks, KohonenSOM, learning vector quantization, RBF and hop field neural networks, Boltzmann machine, artificial immune system, genetic algorithms, genetic programming, particle swarm optimization, ant colony optimization, differential and cultural evolution, coevolution, evolutionary strategies, evolutionary algorithms, differential evolution, key



operators for differential evolution.

CS-415: Multi Agent Systems

Intelligent agents introduction, agents and expert systems, abstract architectures for intelligent agents reactive agents, deliberate agents concrete architectures for intelligent agents, multi-agent systems and societies of agents, agent communications, distributed problem solving and planning, task sharing, distributed planning, search algorithms for agents, distributed rational decision making, task allocation negotiation, learning in multi-agent systems.

CS-416: Natural Language Processing

Introduction and overview, ambiguity and uncertainty in language, regular expressions, Chomsky hierarchy, regular languages, finite-state automata, practical regular expressions, morphology, Regex tools, string edit distance and alignment, key algorithmic tool like dynamic

programming, string edit operations, edit distance, machine translation, context free grammars, constituency, CFG definition, parsing, information theory, the “Shannon game”--motivated by language, entropy, cross-entropy, information gain, language modeling and naive bayes, probabilistic language modeling and applications, Markov models, generative models of language, part of speech tagging and hidden Markov models, the Penn treebank and Brown corpus, probabilistic finite state automata, probabilistic context free grammars, weighted context free grammars, Maximum Entropy Classifiers, the maximum entropy principle, and its relation to maximum likelihood, maximum entropy classifiers and their application to document classification, sentence segmentation.

CS-417: Game Development

History of computer and video games, goals and genres, game design principles, python programming, pygame, storytelling, sprites and animation, game development methodologies, physics, loose ends, audio, sound, and music, 2D game group project check-in, game testing, ethics, MMORPGS, and securing online games, game engines, marketing and maintenance and future of game development.

CS-418: Logical Paradigm of Computing

Introduction to logic, modal logic, propositional and predicate logic and their proof theories, relational and temporal logic, linear time temporal logic (LTL), computation tree logic (CTL), CTL*, mu-calculus, Introduction to model checking and model checking algorithms, formal program verifications, partial order correctness, proof calculus for partial proof rules, introduction to statistical and stochastic processes (random walk, Markov chains, hidden Markov chains), introduction to process algebra, and evolutionary computing.

CS-419 Introduction to Optimization Techniques

Introduction to local and total Optimization, Mathematical Background, Fundamental concepts optimization, Optimize absence of restrictions, Optimization with restrictions, Total Optimization Techniques, Global search algorithms, Genetic Algorithms, Firefly Algorithm, Particle Swarm Optimization (Particle Swarm Optimization), Simulated Annealing, Climbing Hill, Applications using MATLAB, Implementation of exercises and project using MATLAB software.

CS-420 System Loss Prevention Methodologies

Introduction to Information Security, The Security System Development Life Cycle, Security Investigation Phase , Legal, Ethical and Professional Issues in Information Security, Implementing Security, Project management in the Implementation Phase, Technical Aspects of Implementation, Nontechnical aspects of implementation, Access Controls, Interception of Data, Mobile and Portable Systems, Physical Security, Security and Personnel. Staffing the Security Function, Credentials for Information Security Professionals, Employment Policies and Practices, Privacy and Security of Personnel Data.

CS-421 Security Threats and Risk Assessment

Risk Identification, Information Asset Identification, Threat Identification, Identification and Prioritization of Threat Agents, Vulnerability Identification, Risk Assessment(Likelihood Estimate, Information Asset Valuation, Risk Determination), Feasibility Studies (Cost Benefit Analysis, Benchmarking, Best Practices), The Qualitative Risk Analysis Method (Asset Valuation Stage, Risk Evaluation Stage, Risk Management Stage), Other Qualitative Methods (Vulnerability Analysis, Hazard Impact Analysis, Threat Analysis, Questionnaires, Single-Time Loss Algorithm).

CS-422 Information System Forensics and Investigation

Introduction to computer forensics, Understanding computer investigation, Working with Windows and DOS systems, Linux boot processes and disk structures, The investigator's office and laboratory , Understanding forensics lab certification requirements, Determining the physical layout of a computer forensics lab, Current computer forensics tools, Digital evidence controls, Data acquisition, Computer forensics analysis, E-mail investigation, Recovering image file, Writing investigation reports, Becoming an expert witness.

CS-423 Network & Distributed Systems Security

Introduction to Internetworking, protocol architectures, and data transport. Core Internet protocols. Introduction to routing and forwarding, Ethernet and other physical technologies. Limitations due to host machines, network security, and mechanisms for distributed systems. Security methods for distributed systems. Limitations of internet based distributed system and its securities. Processes, memory models, portable code and middleware. Data security aspects, basic cryptology, and network security.

CS-424 Introduction to Cryptography

Brief history of cryptography, encryption (conventional and public key), digital signatures, hash functions, message authentication codes, randomness, unconditional and computational security, zero-knowledge protocols, secure e-commerce, group communication security, anonymity, key escrow. A few popular security mechanisms (e.g., Secure IP, SSL, PGP) will also be discussed. History of cryptography and simple encryption methods, crypto hash functions, public key cryptology, encryption and signatures, authentication and key distribution, protocols(Needham Schroeder, station to station), public key distribution-certification, transport layer security, public key certification and revocation, access control, privacy and anonymity.

CS-425 Wireless Network Security

Overview of wireless networking, Introduction to wireless security, types of security attacks, security policies, Symmetric Encryption and Message Confidentiality, Public Key Cryptography, Wireless Local Area Networks and examining wireless LAN vulnerabilities, Understanding WLAN security models, Managing security in wireless devices, Wireless Cellular Networks and Security, Mobile Ad hoc Networks and Security, Wireless Sensor Networks and Security. Wireless network security issues and defenses.

CS-426 Computer Security

Introduction to Computer Security, Networks and Internet, DoS Tools & Techniques – Tracert, Visual Route, Cyber Stalking, Fraud, and Abuse, Denial of Service Attacks, Scanning – WireShark, Malware, 6: Techniques Used by Hackers, PingPlotter (network monitoring and troubleshooting tool), Industrial Espionage on Cyberspace, Steganography - Caesar cipher to a secret decoder ring tools/project, Encryption, Linux Security Software Tools, Computer Security Software, Develop Security Policy Manual, Security Policies, Vulnerabilities Assessment Projects, Network Scanning and Vulnerability Scanning, Cyber Terrorism and Information Warfare.

CS-427 Cyber Forensic Analysis

Forensics fundamentals and Investigation Processes, File systems and hard-disk Forensics, Steganography, Network forensics, Investigating attacks, Investigating Internet crimes/web browsers forensics, investigation of Emails and email crimes, Mobile forensics, Forensics/investigative reports, witnessing in court, ethics for forensics expert, Cybercrime laws.

CS-428 Introduction to Machine Learning

Introduction to machine learning and statistical pattern recognition. Inductive learning and their algorithms, deductive learning and their algorithms, Supervised learning (generative/discriminative learning, parametric/

nonparametric learning, neural networks, and support vector machines); unsupervised learning (clustering, dimensionality reduction, kernel methods); learning theory (bias/variance tradeoffs; VC theory; large margins); and reinforcement learning and adaptive control. Applications of machine learning, such as to robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

CS-429 Introduction to Data Science

Introduction to data science, data analysis and modeling algorithms, such as clustering, regression, hypothesis testing. Language basics, Searching, heuristic searching techniques, Sorting, Models, Histograms, Distributions, Regressions, Estimation like sample mean and variance, Clustering (K-Means, Fuzzy C Means), Hypothesis testing, Classification, Detection, Forecasting, Prediction.

CS-430 Data Science and Engineering

Introduction to the course; Review of Linear Algebra and Probability, k-Nearest Neighbor Classifiers and Bayes Classifiers, Linear Classifiers and Linear Discriminant Analysis

Naïve Bayes, Logistic Regression, SVM and Model Selection, K-Means Clustering and Applications, Linear Regression and Applications, SVD and Eigen-Decomposition, Principal Component Analysis, basics of neural networks, Neural networks and load prediction, SVM for engineering applications, Logistic regression for customer data analysis, Customer billing and cost savings, Sequence alignment. Global vs local alignment. Dynamic programming, The Smith-Waterman and Needleman-Wunsch algorithms.

CS-431 Big Data Programming

Introduction to big data programming, Map-Reduce, Anatomy of a Hadoop Map-Reduce Program, Summarization Patterns, MongoDB, File Formats, Custom, Writable, Complex Writable types, User Sessions from Logs, Data Organization Patterns, Join Patterns, Filtering

Patterns, Meta Patterns, Spark Introduction, Spark Basics. Big data analysis for structured, semi structured, and unstructured data. Hadoop MapReduce ; Pig Latin.

CS-432 Introduction to Big Data Mining

Pattern Discovery Overview; Pattern Discovery Basic Concepts; Efficient Pattern Mining Methods; Pattern Discovery, Pattern Evaluation; Mining Diverse Frequent Patterns, Sequential Pattern Mining; Pattern Mining Applications: Mining Spatiotemporal and Trajectory Patterns, Constraint-Based Mining, Graph Pattern Mining, Pattern-Based Classification, Pattern Mining Applications: Mining Quality Phrases from Text Data; Advanced Topics on Pattern Discovery, Cluster Analysis Overview; Cluster Analysis Introduction; Similarity Measures for Cluster Analysis, Partitioning-Based Clustering Methods; Hierarchical Clustering Methods, Hierarchical Clustering Methods (continued); DensityBased and Grid-Based Clustering Methods.

CS-433 Deep Learning and Applications

Basics of neural networks, convolutional and recurrent

network structures, deep unsupervised and reinforcement learning, and its applications to problem domains like speech recognition and computer vision. Introduction to Deep learning, Examples of Deep Learning, Deep Learning Intuition, Full-cycle of a Deep Learning Project, Attacking neural networks with Adversarial Examples and Generative Adversarial Networks, DL Strategy, AI and Healthcare, Interpretability of Neural Networks, Deep Reinforcement Learning, RNN, Deep Belief Networks, CNN.

CS-434 Data Visualization

Basic Data Visualization techniques (e.g., tables, charts, plots, etc.), visual thinking, and workflow, Data abstraction, task abstraction, validation, etc. Visualization perception and design. Elementary visual exploratory and confirmatory data analysis. Other visualization topics on tables, spatial data, time-varying data, network and trees, the use of colors and views, focus context, etc. Useful algorithms in data visualization. Modern tools and techniques.



BS Software Engineering

Software plays a central and underpinning role in almost all aspects of daily life: communications, government, manufacturing, banking and finance, education, transportation, entertainment, medicine, agriculture, and law. The number, size, and application domains of computer programs have grown dramatically; as a result, huge sums are being spent on software development. Most people's lives and livelihoods depend on this development's effectiveness. Software products help us to be more efficient and productive. They provide information, make us more effective problem solvers, and provide us with safer, more flexible, and less confining work, entertainment, and recreation environments.

Software Engineering is the application of a systematic, disciplined and quantifiable approach to the design, development, operation, and maintenance of software systems. It is in fact the practice of designing and implementing large, reliable, efficient and economical software by applying the principles and practices of engineering. The department aims to train students in all aspects of software life cycle from specification through analysis and design to testing, maintenance and evolution of software product.



Curriculum

Semester-1

| Course Code | Course Title | Credit Hours |
|----------------------------|--|--------------|
| CS-101 | Introduction to Information and Communication Technologies | 2+1 |
| CS-102 | Programming Fundamentals | 3+1 |
| HS-101 | English | 3+0 |
| MT-101 | Calculus & Analytical Geometry | 3+0 |
| HS-102 | Pakistan Studies | 2+0 |
| BS-105 | Applied Physics | 2+1 |
| Total Credit Hours: | | 18 |

Semester-2

| Course Code | Course Title | Credit Hours |
|----------------------------|---------------------------------|--------------|
| CS-104 | Object Oriented Programming | 3+1 |
| HS-103 | Communication Skills | 3+0 |
| CS-103 | Discrete Structures | 3+0 |
| IS-211 | Islamic Studies | 2+0 |
| CS-204 | Software Engineering | 3+0 |
| HS-403 | Management and Entrepreneurship | 3+0 |
| Total Credit Hours: | | 18 |

Semester-3

| Course Code | Course Title | Credit Hours |
|----------------------------|----------------------------------|--------------|
| CS-201 | Data Structures & Algorithms | 3+1 |
| SE-201 | Software Requirement Engineering | 3+0 |
| CS-408 | Human Computer Interaction | 2+1 |
| MT-203 | Linear Algebra | 3+0 |
| HS-302 | International Relations | 3+0 |
| HS-203 | Community Service | 0+1 (NC) |
| Total Credit Hours: | | 18 |

Semester-4

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------------------------|--------------|
| CS-303 | Operating Systems | 3+1 |
| CS-304 | Database Systems | 3+1 |
| SE-202 | Software Design & Architecture | 2+1 |
| MT-302 | Probability and Statistics | 3+0 |
| CS-302 | Artificial Intelligence | 2+1 |
| Total Credit Hours: | | 17 |

Semester-5

| Course Code | Course Title | Credit Hours |
|----------------------------|--|--------------|
| SE-305 | Software Construction and Development | 2+1 |
| CS-306 | Data Communication and Computer Networks | 3+1 |
| HS-201 | Technical Report Writing | 3+0 |
| SE-3XX | SE Supporting –I | 3+0 |
| SE-3XX | SE Supporting - II | 3+0 |
| Total Credit Hours: | | 16 |

Semester-6

| Course Code | Course Title | Credit Hours |
|----------------------------|--------------------------------|--------------|
| SE-306 | Software Quality Engineering | 3+0 |
| CS-402 | Information Security | 3+0 |
| HS-401 | Professional Values and Ethics | 2+0 |
| CS-312 | Web Engineering | 2+1 |
| SE-4XX | SE Elective - I | 3+0 |
| SE-3XX | SE Supporting - III | 3+0 |
| Total Credit Hours: | | 17 |

Semester-7

| Course Code | Course Title | Credit Hours |
|----------------------------|-------------------------------|--------------|
| SE-401 | Software Project Management | 3-0 |
| SE-402 | Software Re-Engineering | 3-0 |
| SE-4XX | SE Elective -II | 3-0 |
| SE-4XX | SE Elective - III | 3-0 |
| ME-407 | Health Safety and Environment | 1+0 |
| SE-499 | Final Year Project - I | 0-3 |
| Total Credit Hours: | | 16 |

Semester-8

| Course Code | Course Title | Credit Hours |
|----------------------------|-------------------------|--------------|
| SE-4XX | SE Elective – IV | 3-0 |
| SE-4XX | SE Elective – V | 3-0 |
| HS-404 | Foreign Language | 1-1 |
| HS-402 | Economics | 2-0 |
| SE-499 | Final Year Project – II | 0-3 |
| Total Credit Hours: | | 13 |

Supporting courses

| Course Code | Course Title | Credit Hours |
|---------------------------------------|--|--------------|
| SE-301 | Business Process Engineering | 3-0 |
| CS-313 | Formal Methods in Software Engineering | 3-0 |
| SE-302 | Operations Research | 3-0 |
| SE-303 | Simulation and Modeling | 3-0 |
| SE-304 | Stochastic Processes | 3-0 |
| Total (Any THREE of the above) | | 9-0 |

Elective courses

| Course Code | Course Title | Credit Hours |
|--------------------------------------|----------------------------------|--------------|
| SE-403 | Agent Based Software Engineering | 3-0 |
| SE-404 | Big Data Analytics | 3-0 |
| SE-405 | Cloud Computing | 3-0 |
| SE-406 | Data Encryption and Security | 3-0 |
| SE-407 | Global Software Development | 3-0 |
| SE-408 | Information Systems Audit | 3-0 |
| SE-409 | Management Information Systems | 3-0 |
| SE-410 | Multimedia Communication | 3-0 |
| SE-411 | Real Time Systems | 3-0 |
| SE-412 | Semantic Web | 3-0 |
| SE-413 | Software Engineering Economics | 3-0 |
| SE-414 | Software Metrics | 3-0 |
| SE-415 | Systems Programming | 3-0 |
| CS-305 | Computer Graphics | 3-0 |
| CS-417 | Game Development | 3-0 |
| CS-403 | Mobile Application Development | 3-0 |
| CS-416 | Natural Language Processing | 3-0 |
| Total (Any FIVE of the above) | | 15-0 |

**Course Contents****CS-101: Introduction to Information and Communication Technologies**

For contents, please refer to page number 105.

HS-101: English

For contents, please refer to page number 24.

MT-101: Calculus & Analytical Geometry

For contents, please refer to page number 149.

CS- 102: Programming Fundamentals

For contents, please refer to page number 105.

HS- 102: Pakistan Studies

For contents, please refer to page number 173.

HS-103: Communication Skills

For contents, please refer to page number 24.

CS-103: Discrete Structures

For contents, please refer to page number 105.

CS-104: Object Oriented Programming

For contents, please refer to page number 105.

BS-105: Applied Physics

For contents, please refer to page number 38.

CS-201: Data Structures & Algorithms

For contents, please refer to page number 106.

HS-201: Technical Report Writing

For contents, please refer to page number 25.

SE-201: Software Requirement Engineering

Basics of Requirements Engineering. RE Processes. Requirements Analyst Role, Tasks, Essential Skills & Knowledge. Dealing with Customers. Prototype Categories. Evaluation, Risks, Validating the Requirements. Documenting the Requirements. Non-Functional Requirements. Software Quality Attributes. Setting Requirements Priorities. Special Requirements Challenges. Requirements Development Plans. Requirements Management Principles and Practices. Requirements Creeping. Tracing Requirements. Tools for Requirements Management. Software Requirements Risk Management.

SE-202: Software Design & Architecture

Basics of Software Architecture (SA). Characteristics of SA, Importance of SA, SA Business Cycle and Software Processes, Architectural Patterns. SA Case Study. Creating Architecture, Quality Attributes, Business Qualities, Architecture Qualities. Achieving Qualities. Global Analysis. Conceptual Architecture View. Module Architecture View. Execution Architecture View. Code Architecture View. Designing & Documenting the Architecture. Analyzing Architectures. The CBAM. Reconstructing Software Architectures. A Quantitative Approach to Architecture Design Decision Making, Decision Making Context, The Basis for the CBAM, Implementing the CBAM.

MT-203: Linear Algebra

For contents, please refer to page number 150.

HS-203: Community Service.

For contents, please refer to page number 25.

CS-204: Software Engineering

For contents, please refer to page number 106.

IS-211: Islamic Studies

For contents, please refer to page number 172.

SE 301: Business Process Engineering

Business Process Definitions, Business Process Analysis and Modeling, Business Process Lifecycle, Policies, Procedures and Rules (in terms of business processes) Role of People, Customers, Trading Partners and Suppliers in Business Processes, Business Process



Simulation, Business Process Re-Engineering (objectives and techniques), Basic concepts of Six Sigma (in terms of business process improvement). Modeling in BPMN. Properties of Business Processes. Workflow Management Architectures, Flexible Workflow Management, Web Services and their Composition, Advanced Service Composition, Data-Driven Processes. Business Process Management Methodology.

SE-302: Operation Research

Methodology of Operations Research. Linear programming: solving methods, duality, and sensitivity analysis. Integer Programming. Network flows. Multi-criteria decision techniques. Decision making under uncertainty and risk. Game theory. Methods in dynamic programming. Methods of the heuristics techniques, greedy methods and population based methods.

HS-302: International Relations

For contents, please refer to page number 173.

MT-302: Probability and Statistics

For contents, please refer to page number 150.

CS-302: Artificial Intelligence

For contents, please refer to page number 107.

CS-303: Operating Systems

For contents, please refer to page number 108.

SE-303 Simulation and Modeling

Introduction of modelling and simulation, Model Syntax and Semantics, Causal Block Diagrams, State Automata and Petri Nets, Higraphs and Statecharts, Discrete Event World Views, DEVS, Process Interaction (GPSS), Pseudo-random generators, input/output analysis, Animation of simulation results, Continuous-time models, solvers, sorting, Population Dynamics, System Dynamics, Object-oriented Modelling of Physical Systems, System Specification Hierarchy and Model Classification.

CS-304: Database Systems

For contents, please refer to page number 108.

SE-304 Stochastic Processes

Concepts of probability: random variables, probability

distributions, expectations, Stopping times and examples, Concepts of probability: conditional probability, conditional expectations, Generation of random variables and introduction to simulation, Markov chains introduction, classification of states and properties, Simulation models: tick-based and discrete event-based methods, Simulation models: standard clock method and reduced models, examples: Petri nets, aggregated models, Analysis of absorbing Markov chains, examples. Branching processes and time to extinction, Analysis of stationary Markov chains, examples. Reversible chains, Statistical analysis of simulation output, Confidence intervals, stopping tests, Statistical analysis of simulation output for stationary problems, Confidence intervals, stopping tests, Continuous time Markov chains, birth and death processes, reversibility and Renewal processes.

SE-305: Software Construction and Development

The system engineering context, Basic principles of requirements analysis (approaches and notations), Requirements specification, SDL – structure and behavior, SDL – data and timers, SDL - concurrency and dynamic process creation, Introduction to language and compilers, Lexical analysis: formal languages, regular expressions, finite state machines, deterministic and non-deterministic finite automata, transformation from regular expression to DFA, tools for lexical analysis (Lex), Syntax analysis: parse trees, ambiguity, context-free grammars, LL(1) parsing method, semantic analysis and semantic attributes (this section may or may not be covered), different notations for specifying languages, Chomsky's hierarchy, Concurrency: concept of concurrency, sub-program level concurrency, semaphores, monitors, message passing, Java threads, Implementation design, Verification and validation.

CS-305: Computer Graphics

For contents, please refer to page number 108.

CS-306: Data Communication and Computer Networks

For contents, please refer to page number 108.

SE-306: Software Quality Engineering

Introduction to software quality assurance, Inspections and reviews, Principles of software validation, Software verification, Software testing, Specification based test construction techniques, White-box and grey-box testing, Control flow oriented test construction techniques, Data flow oriented test construction techniques, Operational profiles, boundary testing techniques, Software Reliability Models, Cleanroom approach to quality assurance, Software process certification.

CS-312: Web Engineering

For contents, please refer to page number 109.

CS-313: Formal Methods in Software Engineering

For contents, please refer to page number 109.



HS-401: Professional Values and Ethics

For contents, please refer to page number 173.

SE-401: Software Project Management

Introduction to Software Project Management, PM Tools, PMI's Knowledge Areas, PMI Framework, PMI Process Groups. Understanding Organizations. Project Planning. Project Evaluation. Selection of an Appropriate Approach in Project. Software Effort Estimation. Activity Planning. Risk Management. Evaluating the Risks to the Schedule. Risk Control, RMMM, Configuration Management & Maintenance, Environment for Configuration Control. Resource Allocation. Monitoring & Control. Review and Evaluation. Challenges of Outsourcing in Project Management, Presentations. Quality & Application.

CS-402: Information Security

For contents, please refer to page number 110.

SE-402: Software Re-Engineering

Software maintenance, Software maintenance process models, Change request and change request management, Evolution and Impact Analysis, System Release Planning, Version and Release management issues, Quick-and-Fix Model, Boehm's Model, Software Types: S-Type, P-Type, Lehman's laws, Legacy Systems Structure and definitions, Legacy System Design, Software Cost Modeling, Software Cost Computing, Software Reengineering in Maintenance, Software Reuse and Reuse Landscape, Software Metrics.

HS-402: Economics

For contents, please refer to page number 28.

HS-403: Management and Entrepreneurship

For contents, please refer to page number 29.

CS-403: Mobile Application Development

For contents, please refer to page number 111.

SE-403: Agent Based Software Engineering

Overview of agent-based software engineering. Methodologies for agent-based modeling, analysis and design: Agent-based Unified Modeling Language (AUML), Agent-based analysis and design, other agent-based analysis and design methods. Agent communication and knowledge sharing: knowledge level communication among software agents, Knowledge Interchange Format (KIF), Agent-based System Architecture and Organization. FIPA: Foundation for Intelligent Physical Agents: FIPA specification, the application, abstract architecture, agent communication, agent management and agent message transport standards and guidelines.

HS-404: Foreign Language

For contents, please refer to page number 30.

SE-404: Big Data Analytics

Introduction to Big Data Analytics, Big Data Platforms, Data Store & Processing using Hadoop, Big Data Storage and Analytics, Big Data Analytics ML Algorithms, Recommendation, Clustering, and Classification, Linked Big Data: Graph Computing and Graph Analytics, Graphical Models and Bayesian Networks, Big Data Visualization, Cognitive Mobile Analytics.

SE-405: Cloud Computing

Introduction to the course: defining the Cloud Computing, the roots of Cloud Computing, Cloud Computing Deployment models, Cloud service models (IaaS, PaaS, SaaS). Characteristics of Cloud Computing/ advantages and disadvantages of adopting Cloud Computing.

Cloud Computing Architecture layers, Cloud Computing methodologies. Security in Cloud Computing. Cloud-based service selection, SMI (business key attributes). Cloud Economics (1): Resource Provisioning in Cloud Computing and cost optimization. Cloud Economics (2): Multitenancy in Cloud Computing, Monitoring in Cloud Computing. Examples of Cloud Computing applications: Google, Azure platform, Amazon Web Services. Other examples in the Internet such as Force.com, SoundCloud, HyperOffice, MyMusicCloud.

SE-406: Data Encryption and Security

Introduction and Overview of Cryptography, Classical Cryptosystems, Number Theory Background, The Data Encryption Standard, The Advanced Encryption Standard, The RSA Algorithm and Public Key Cryptography, Discrete Logarithms and More Public Key Cryptosystems, Hash Functions, Message Authentication Codes, Digital Signatures. Modern data encryption methods and security methods.

ME-407: Health Safety and Environment

For contents, please refer to page number 63.

SE-407: Global Software Development

Introduction to Global Software Development. Global Teams and Organization. Guideline for making the virtual team. The Geography of Coordination. Dealing with Distance. Architectures and Coordination: Reconfiguration of Existing Product Technologies, Identification of Coordination Requirements. Distributed Development Environments: Software configuration management, Awareness among Configuration Management. Challenges of Culture: Managing distances and differences in geographically distributed work groups. The Outsourcing Relationship. Facilitating Cross-site Trust, Cooperation, and Social Capital: Communication and Trust in Global Virtual Teams. Social Networks and Knowledge Networks. Communication and Awareness: dealing with distance. Assessing Coordination Risk.

SE-408: Information Systems Audit

Introduction to Auditing, IS Audit charter, Polices, Procedures, The Audit Process, Audit computer networks and communication, Auditing software development, Acquisition, Maintenance, Auditing IT infrastructure, Auditing Management and Organization, Business process re-engineering: IS audit proposal, report, evidence and follow-up, complaint to standard, Enterprise service agreement, IP pro count policies and process, Backup and procedures, Overview of Computer-Assisted Audit Tools and Techniques.

CS-408: Human Computer Interaction

For contents, please refer to page number 111.

SE-409: Management Information System

Introduction to Information Systems in Organizations; Business Process and Decision Making; Productivity, Innovation and Strategy; Database and Content Management; Decision Making and Business Intelligence; Competitive Advantage and Business Processes; Networks and Collaboration; ERP and E-commerce, Social Networking, and Web 3.0; Acquiring Information Systems Through Projects; Structure, Governance, and Ethics; Managing Information Security and Privacy

SE-410: Multimedia Communication

Multimedia content, picture, voice, data. Multimedia service in the real time. Classification of the multimedia services. Picture signal digitalization. Analogue black and white picture signal. Color picture and RGB signal, Y,Cr,Cb. Resolution of the picture. Structure of the picture signal information, luminescence and chromatic components. Luminescence and color triangle. NTCS, PAL, SECAM TV standards of video signal transmutations. Luminescence and color sensitivity of the human eye. Different resolution for luminescence and color components of the pictures. Inertia of Eye. Picture digital signal compression. Compression principles. Structure of video content, video sequence, picture, partition of picture, macro blocks,

block, picture element pixel. Spatial dimension of the picture. Principles of the video compression method. I, P and B pictures in video content. Compression on the block level. Cosines and Wavelet transformation. Quantization and in formations loss. Overview of multimedia systems, Audio/Video fundamentals (representation, human perception, equipment and applications). Audio and video compression (e.g., JPEG, MPEG, H.26X, etc.), scalable coding, perceptual audio encoders. Performance comparison of coding algorithms, Algorithms for image and video processing, multimedia programming.

SE-411: Real Time Systems

Introduction to Real-Time Systems, Categories, Characteristics and challenges, Requirement Specification and Design, Design fundamentals, Elements of modular design, Concurrency, Real-time & other application areas, Real-Time Operating Systems, Memory management, Fundamental of microprocessor based systems, Input-output interfacing technique, Real-time programming, Real-Time Analysis, Schedulability analysis, Scheduling policies, Designing with rate-monotonic analysis

SE-412: Semantic Web

Introduction to the semantic web, introduction to ontologies, ontology languages for the semantic web, Resource Description Framework (RDF), lightweight ontologies: RDF Schema, model ontologies using Resource Description Framework (RDF) , model and design ontologies using Web Ontology Language (OWL), Web Ontology Language (OWL), query language for RDF: SPARQL, Ontology Engineering, Semantic web and Web 2.0 and applications of Semantic Web.

SE-413: Software Engineering Economics

Programming aspects, economic aspects, human relations aspects, software trends: cost, social impact, the plurality of SE Means, The GOALS Approach to Software Engineering, The Software Work Breakdown Structure (WBS), Software Maintenance, introduction to COCOMO,

definitions and assumptions, development effort and schedule, phase distribution, The Rayleigh Distribution, interpolation, basic software maintenance effort estimation. Performance Models, Optimal Performance, Sensitivity Analysis, Cost Effectiveness Models. Cost Drivers: Project Attributes–Modern Programming Practices, Use of Software Tools, Schedule Constraint.

SE-414: Software Metrics

Overview of software metrics; Basics of measurements; Goal-based framework for software measurement; Software measure classification; Empirical investigation, principles and techniques; Formal experiments: Planning, principles, types and selection; Measuring internal product attributes: size and structure; Measuring cost and effort; Measuring external product attributes: quality and reliability; Software test metrics; Object-oriented metrics.

SE-415: Systems Programming

Introduction to the Microsoft Windows ® Operating System, File Processing, Memory Management, Memory Mapped Files and DLLs, Process management, Threads and scheduling, Terminal control and signals, Event driven programming, I/O redirection and pipes, Servers and sockets, Thread synchronization, Inter-process Communication, Input/Output, Device Drivers (USB or Parallel Port), File System Drivers, Filter Drivers.

CS-416: Natural Language Processing

For contents, please refer to page number 113.

CS-417: Game Development

For contents, please refer to page number 113.

MS Computer Science Program

The exponential growth in computing and technology has undoubtedly created a great demand for the professionals in the area of computer science. In order to fulfill qualified human resource for meeting demands of the IT industry, academia and software market, the Department of Computer Science and Engineering (DCS&E) started its MS Computer Science (MSCS) program in Fall 2014. The vision of this program is to bridge the gap by producing qualified manpower for expansion and growth of software industry in Pakistan which will play a key role for the socio-economic uplift of the country. MSCS Program offers an opportunity for the computer professionals to grab jobs in the software industry, academia and research-oriented organizations in order to contribute in the areas of advanced analysis of algorithms, theory of computation, simulation & modeling, multimedia communication, cryptography and security, computer vision, machine learning, decision support systems, data mining, web engineering, software project management, software quality assurance, requirement engineering, operating systems, next generation networks, parallel & distributed computing, mobile and pervasive computing, computer networks, artificial Intelligence, Image processing, database systems, software engineering, and human computer interface etc. To fulfill the MS degree requirements, a student needs to complete 30 credit hours by taking 8 courses of 24 credit hours and 6 credit hours of thesis. The objective of thesis is to enable our students to select a problem, identify research questions, develop hypothesis, conduct experiments and furnish their findings. However, a student may opt for non-thesis option and in this case, he/she has to take 10 courses and a mandatory technical report. Curriculum has been designed in accordance with guidelines of the HEC. The courses can be selected from the list of courses offered in the semesters.

List of Courses

Core Courses

| Course Code | Course Title | Cr. Hr. |
|-------------|--------------------------------|---------|
| CS-801 | Advanced Theory of Computation | 3+0 |
| CS-802 | Advanced Algorithm Analysis | 3+0 |

List of Elective Courses

| Course Code | Course Title | Cr. Hr. |
|-------------|--------------------------------------|---------|
| EE-801 | Advanced Computer Architecture | 3+0 |
| CS-811 | Advanced Computer Networks | 3+0 |
| CS-812 | Wireless Networks | 3+0 |
| CS-813 | Network Simulation & Modeling | 3+0 |
| CS-814 | Multimedia Communication | 3+0 |
| CS-815 | Cryptography & Network Security | 3+0 |
| CS-822 | Advanced Digital Image Processing | 3+0 |
| CS-823 | Machine Learning | 3+0 |
| CS-824 | Advanced Neural Networks | 3+0 |
| CS-825 | Decision Support Systems | 3+0 |
| CS-829 | Advanced Computer Vision | 3+0 |
| CS-831 | Advanced Database Management Systems | 3+0 |
| CS-832 | Data Mining | 3+0 |
| CS-833 | Data Warehousing | 3+0 |
| CS-834 | Web Engineering | 3+0 |
| CS-835 | Advanced Web Analytics | 3+0 |
| CS-836 | Semantic Web | 3+0 |
| CS-841 | Advanced Software Engineering | 3+0 |
| CS-842 | Advanced Software Project Management | 3+0 |
| EC-842 | Wireless and Mobile Communication | 3+0 |
| CS-843 | Software Quality Assurance | 3+0 |

| | | |
|--------|---|-----|
| CS-844 | Information Security | 3+0 |
| CS-853 | Next Generation Networks | 3+0 |
| EC-853 | Pattern Recognition & Analysis | 3+0 |
| CS-854 | Advanced Information Management Systems | 3+0 |
| EC-854 | Neural and Fuzzy Systems | 3+0 |
| CS-855 | Object Oriented Databases | 3+0 |
| CS-856 | Software Architecture | 3+0 |
| CS-857 | Parallel & Distributed Systems | 3+0 |
| CS-858 | Research Methods | 3+0 |
| CS-859 | Mobile & Pervasive Computing | 3+0 |
| CS-861 | Operation Research | 3+0 |
| EC-861 | Advanced Operating Systems | 3+0 |
| EC-872 | Data Communication & Networks | 3+0 |
| EC-876 | Embedded Wireless Sensor Networks | 3+0 |
| CS-877 | Soft Computing | 3+0 |
| CS-878 | Intelligent Systems | 3+0 |
| EC-878 | Adhoc Networks | 3+0 |
| CS-879 | Multimedia Systems and Applications | 3+0 |
| EC-879 | Distributed Embedded Computing | 3+0 |
| CS-880 | Mobile Communication Systems | 3+0 |
| CS-883 | Advanced Cloud Computing | 3+0 |
| CS-885 | High Performance Computing | 3+0 |
| EC-891 | Pervasive Devices and Technology | 3+0 |
| EC-892 | Real-time Systems | 3+0 |
| CS-940 | Special Topics in Requirement Engineering | 3+0 |
| CS-950 | Selected Topics in Human Computer Interface | 3+0 |
| CS-899 | Thesis | |

PhD Computer Science

DCS& E has recently launched PhD Computer Science program. It is a full-time study program for the scholars to enhance their expertise and professional skills by studying advanced courses and through the application of latest research methodologies. Department is committed to train and produce graduates that have comprehensive knowledge and are capable of integrating their professional education and experience to solve real-life problems through innovative ideas. Program emphasizes on quality research as a gateway to new horizons of scientific knowledge and discovery. The PhD curriculum is flexible and has been designed considering HEC guidelines. Within the scope of general requirements, students may opt to suit their individual research interests based on their educational backgrounds. Experienced researchers and highly qualified faculty members working in multiple research domains are available to guide the students. Research groups are working in different fields of computer science including major areas such as advanced

analysis of algorithms, theory of computation, simulation & modeling, multimedia communication, cryptography and security, computer vision, machine learning, decision support systems, data mining, web engineering, software project management, requirement engineering, operating systems, next generation networks, parallel & distributed computing, mobile and pervasive computing, artificial Intelligence, image processing, database systems, software engineering, and human computer interaction. The program comprises 18 credit hours of coursework and 30 credit hours of research. The courses can be selected in consultation with the respective PhD supervisors from the list of graduate courses. The PhD program requires candidates to undertake six graduate level courses and must pass the qualifying examination before undertaking the research work in a chosen area for the doctoral thesis. The courses and their contents are given as follows:-



List of Elective Courses

| Course Code | Course Title | Credit Hours | Course Code | Course Title | Credit Hours |
|-------------|--|--------------|-------------|---|--------------|
| EE-801 | Advanced Computer Architecture | 3+0 | CS-838 | Data Visualization | 3+0 |
| CS-802 | Advanced Algorithm Analysis | 3+0 | CS-839 | Multimedia and Web Databases | 3+0 |
| EC-803 | VLSI Architecture & Design | 3+0 | CS-841 | Advanced Software Engineering | 3+0 |
| EC-805 | Microcontroller system design & applications | 3+0 | CS-845 | Research Trends in Requirement Engineering | 3+0 |
| EC-809 | High performance programming with multicore & GPUs | 3+0 | CS-846 | Intelligent User Interfaces | 3+0 |
| CS-811 | Advanced Computer Networks | 3+0 | CS-847 | Global System Development | 3+0 |
| CS-813 | Network Simulation & Modeling | 3+0 | EC-853 | Pattern Recognition & Analysis | 3+0 |
| CS-814 | Multimedia Communication | 3+0 | CS-857 | Parallel & Distributed Systems | 3+0 |
| CS-815 | Cryptography & Network Security | 3+0 | CS-876 | Neural and Fuzzy Systems | 3+0 |
| CS-816 | Advanced Wireless Networks | 3+0 | CS-877 | Soft Computing | 3+0 |
| CS-817 | Research Trends in Pervasive Computing | 3+0 | CS-878 | Intelligent Systems | 3+0 |
| CS-818 | Network Performance Evaluation | 3+0 | CS-879 | Multimedia Systems and Applications | 3+0 |
| CS-819 | Information Theory & Coding | 3+0 | CS-880 | Mobile Communication Systems | 3+0 |
| CS-822 | Advanced Digital Image Processing | 3+0 | CS-881 | Advanced Big Data Analysis | 3+0 |
| CS-823 | Machine Learning | 3+0 | CS-882 | Contemporary Issues in Distributed Database Systems | 3+0 |
| EC-825 | Embedded Control Systems | 3+0 | CS-883 | Advanced Cloud Computing | 3+0 |
| CS-827 | Advanced Pattern Recognition | 3+0 | CS-884 | Advanced Evolutionary Computing | 3+0 |
| CS-829 | Advanced Computer Vision | 3+0 | CS-885 | High Performance Computing | 3+0 |
| CS-831 | Advanced Database Management Systems | 3+0 | EC-892 | Real Time Systems | 3+0 |
| EC-831 | Advanced Digital Signal Processing | 3+0 | CS-910 | Selected Topics in Computer Networks | 3+0 |
| CS-832 | Data Mining | 3+0 | CS-920 | Selected Topics in Digital Image Processing | 3+0 |
| CS-835 | Advanced Web Analytics | 3+0 | CS-930 | Special Topics in Database Management Systems | 3+0 |
| CS-837 | Distributed Database Systems | 3+0 | CS-941 | Selected Topics in Software Engineering | 3+0 |

Computer Science and Computer Engineering Laboratories

Practical experience is part and parcel of every professional institution. The Departments of Computer Science & Computer Engineering maintain a wide variety of state-of-the-art laboratories. There are seven dedicated, spacious and well-equipped laboratories, providing software and hardware resources. The manuals of all lab experiments have been prepared and are in-line with curriculum of the program. All the laboratories are equipped with latest machines with licensed and updated software. Lab experiments are conducted by the experienced and qualified lab engineers under the guidance of faculty members. The latest, state-of-the-art PC workstations are set up with wired and wireless internet access to facilitate students in completing their assignments, lab reports, etc. The detail of laboratories is given below:

Computing Lab:

This general-purpose Computing Lab provides open access support for computer science and computer engineering students. All general-purpose software packages are installed on the latest machines. This lab is dedicated for core computing courses such as programming fundamentals, object-oriented programming, data structures and algorithms etc.

Digital Signal Processing Lab:

Each machine of this lab provides specialized software in addition to general purpose software design and application. This laboratory is dedicated for core computing and signal processing courses. Students can get maximum benefit by having hands-on experience by utilizing the latest workstations and simulation tools and training kits required for the completion of experimental work.

Embedded Systems Lab:

It provides embedded and other hardware resources that are required to design, analyze and implement embedded systems. In addition, the lab also has a number of analog and digital equipment required for experimentation and

project completion at both junior and senior level of undergraduate studies.

Data Communication and Networks Lab:

It is utilized to conduct experiments for communication courses in the field of wired and wireless communication. It helps the students in grasping theoretical concepts and visualization of data transmission in terms of bits and bytes. Peer-to-peer and client-server models along with various network topologies are demonstrated. Different simulation packages are installed in the lab to get an in-depth understanding and practical exposure to network communication technologies.

Artificial Intelligence Lab:

The Artificial Intelligence (AI) Lab focuses on advancing computer vision and decision-making systems necessary for computers to make critical decisions when interacting with the world. It greatly helps students to do where in different areas such as rational decision making, distributed systems of multiple agents, machine learning, reinforcement learning, cognitive learning, game theory, natural language processing and robotics.

Database Systems Lab:

A wide variety of graphics, CAD, database management software, and other software packages are available on these machines. Students use this lab heavily for designing database solutions, generating queries, implementing interactive processing and developing most suitable GUIs.

Electronics Lab:

Electronics Lab is equipped with components such as diodes, transistors, operational amplifiers, oscilloscope, power supplies and function generators which are essentially required to practically implement the theoretical concepts of electronic systems.

Digital Systems Lab:

Digital Systems Lab is designed for the understanding

of digital logic concepts and consists of oscilloscopes, digital trainers, digital multimeters, function generators, 8086 microprocessor kits and supporting accessories. Implementation of adders, subtractors, logic circuits, decoders, encoders, multiplexers, combinational circuits, sequential logic circuits, flip-flops, counters and registers also carried out in this lab. It also covers practical implementation of microprocessor and interfacing techniques.

Electronic Workshop Lab:

Electronic Workshop Lab provides hands-on experience to students about different electronic measuring

equipment such as oscilloscopes, Meggers, analog/ digital multimeters and single/three-phase watt-meters.

Computer Aided Engineering Drawing (CAED) Lab:

CAED Lab has been established to address the basic designing needs of all areas of engineering including building design, floor plans in Civil Engineering, component design in mechanical engineering and preparation of schematic diagram or machines and various components in electrical and electronics engineering.



FACULTY OF BASIC SCIENCES



Prof. Dr. Muhammad Ayub
Dean

The Faculty of Basic Sciences (FBS) comprises Departments of Mathematics and Islamic Studies. Both the Departments offer undergraduate and post graduate programs. The faculties of both the Departments are recognized for its excellence in research and are producing MS and PhD students of international standard. Both the Departments are also offering quality courses for their undergrad programs. Over the years, the faculty has been very revolutionary in its approach in offering state of the art courses and of new trends. Our faculty members are as dedicated to teaching as they are in their research pursuits, bringing their knowledge into the learning environment and encouraging our students to develop and flourish academically. We pride ourselves on imparting students with the skills, knowledge, and the ability to discover and understand themselves through research led-teaching. We are passionate about delivering inspirational, innovative and cutting edge

subject matter. Our goals are embedded in our strategy. Learning of students takes place through an emergent process of exploration and discovery. Guided by subject experts and those with specialist roles in learning support, students use the scholarly and research practices of their disciplines to move towards autonomy in creating and sharing knowledge. Apart from classroom teaching, the faculty members remain involved in the supervision of the students while guiding them in various extra and co-curricular activities, literary pursuits and competitions within and outside University. The conducive learning environment provided by the Faculty of Basic Sciences ensures attainment of our objectives.

You will be glad to know that HITEC University is planning to launch BS Physics, BS English and BBA programs from Fall 2020.

The Faculty is led by Prof. Dr. Muhammad Ayub who has more than 30 years of teaching and research experience. He did his M.Sc., M. Phil. And PhD from Quid-i-Azam University where he has been teaching for a long time and served there as Chairman Department of Mathematics and Dean Faculty of Natural Sciences. He has produced 20 PhD and more than 80 M. Phil students and published more that 115 research papers in journals of international repute. In 2004, he has been declared “Best University Teacher” by HEC. The Pakistan Academy of Sciences has awarded him two gold medals on the basis of his research evaluation.

Department of Mathematics



Dr. Zahid Iqbal
Chairman

It is a universally established fact that Mathematics infuses logic, rationality and a systematic process of analysis. These attributes provide the requisite “spine” to basic sciences formulating the foundation of all engineering subjects. The Department of Mathematics at HITEC University was established in 2010 that aims at providing a comprehensive knowledge of Mathematics at undergraduate as well as graduate and doctoral level. At undergraduate level the students of engineering disciplines are provided with knowledge of Applied and Engineering Mathematics.

The MS & PhD (Mathematics) programme has earned a great repute over the years and students all over the country show great enthusiasm for admission in the Department of Mathematics HITEC University. The students are imparted state of the art education and the curriculum has been synthesized with objective to produce conceptual and motivated mathematicians of international standard. Various syllabi, therefore, have been designed to enrich the students’ understanding towards the subject of Mathematics with a view to helping them encounter practical problems successfully in their careers.

Apart from going through the course work, the students

are encouraged to carry out research work, leading to publications in renowned international journals. Being mindful of the importance of subject of Mathematics, the University has inducted highly qualified research oriented permanent faculty members, all but one PhD, to meet all the challenges at undergraduate as well as graduate and doctoral levels. The Department has successfully produced 21 PhDs and 150+ MSs in a typical span of time.

With the launch of four-year BS (Mathematics) in Fall-2019, the Department is now going to build its own incubation space for the research students to embark on MS & PhD programme of Mathematics at HITEC University. This programme will develop the analytical, abstract and structured thinking of student. The student will be able to acquire the skill and knowledge from an exceptionally broad range of topics covering Pure and Applied Mathematics, Mathematical Modeling, Numerical Analysis, Statistics and Operational Research.

Despite teaching Mathematics a plentiful emphasis is laid on the character building of young students. This aspect is taken care of consciously so that after graduating from this institution they should not only portray themselves as good Mathematicians but also as good citizens and good Muslims.

The department has successfully pitched a dedicated and flagship forum ‘ICAEM’ for mathematics community that provides a platform for the presentation and discussion of newly emerging ideas and concepts in the field of Applied and Engineering Mathematics. It intends to bring together the system designers and practicing engineers to gain cognizance of the researchers’ state-of-the-art findings covering a wide domain of Applications in the field of Mathematics. International Conference on Applied and Engineering Mathematics is the event that is organized annually under the auspices of Mathematics Department HITEC University. National and International keynotes are especially invited to present their research work at the occasion.

Faculty

Dr. Zahid Iqbal (HEC Approved Supervisor)

Designation: Assistant Professor & Chairman
Qualification: PhD (Mathematics) Quaid-i-Azam University, Islamabad
Area of Interest: Fluid Mechanics, Nanofluids, Boundary Layer Flows, Numerical and Series Solutions
Contact: zahid.iqbal@hitecuni.edu.pk

Dr. Muhammad Ayub (HEC Approved Supervisor)

Designation: Professor and Dean Faculty of Basic Sciences
Qualification: PhD (Mathematics) Quaid-i-Azam University Islamabad
Area of Interest: Wave Motion and Fluid Dynamics
Contact: mayub@hitecuni.edu.pk

Dr. Ehnber Naheed (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Mathematics) Quaid-i-Azam University, Islamabad
Area of Interest: Fluid Mechanics, Peristaltic Transport, Analytical and Numerical Solution of nonlinear DEs
Contact: ehnbber.naheed@hitecuni.edu.pk

Dr. Rashid Mehmood (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Mathematics) Quaid-i-Azam University, Islamabad
Area of Interest: Nanofluids, Rheology, Heat Transfer, Numerical and Series Solutions
Contact: rashid.mehmood@hitecuni.edu.pk

Dr. Naveed Ahmed (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Mathematics) HITEC University, Taxila
Area of Interest: Fluid Mechanics, Numerical and Analytical Techniques, Solitary wave theory, Fractional calculus
Contact: naveed.ahmed@hitecuni.edu.pk

Dr. Shagufta Ijaz (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Mathematics), Quaid-i-Azam University, Islamabad
Area of Interest: Fluid Mechanics, Peristaltic Transport, Mathematical Biology
Contact: shagufta.ijaz@hitecuni.edu.pk

Dr. Farman Ullah Khan (HEC Approved Supervisor)

Designation: Assistant Professor
Qualification: PhD (Mathematics), COMSATS University Islamabad
Area of Interest: Computational Fluid Dynamics, Liquid Chromatography, Process Engineering
Contact: farman.khan@hitecuni.edu.pk

Ms. Rafay Mustafa

Designation: Lecturer
Qualification: MPhil (Mathematics), NUST Islamabad
Area of Interest: Computational Mathematics
Contact: rafay.mustafa@hitecuni.edu.pk

Ms. Ummal Baneen

Designation: Academic Coordinator
Qualification: MS (Computer Science), COMSATS University Islamabad, Wah Campus
Contact: coordinatormaths@hitecuni.edu.pk

BS Mathematics

BS Mathematics programme is designed for students who want to pursue their study in the field of Mathematics. It is a wide-ranging bachelor degree program which includes subjects like Calculus, Discrete Mathematics, Elementary Number Theory, Real Analysis, Analytical Mechanics etc. The designed curriculum is in accordance with the guidelines provided by Higher Education Commission (HEC) of Pakistan and is comprehensive enough to provide students with the necessary academic foundation to acquire higher degrees such as MS and PhD in Mathematics.

The program spans over four years (eight semesters) and comprises 132 credit hours. The semester wise breakup of curriculum is given as follows:



Curriculum

Semester-1

| Course code | Course Title | Credit Hrs |
|---------------------------|--|------------|
| IS-211 | Islamic Studies | 2+0 |
| HS-101 | English | 3+0 |
| CS-101 | Introduction to Information and Communication Technologies | 2+1 |
| PHY-101 | Introduction to Mechanics | 3+1 |
| MTH-104 | Elements of Set Theory and Mathematical Logic | 3+0 |
| MTH-105 | Calculus-I | 3+0 |
| Total Credit Hours | | 18 |

Semester-2

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------|------------|
| HS-102 | Pakistan Studies | 2+0 |
| HS-103 | Communication Skills | 3+0 |
| PHY-102 | Electricity and Magnetism | 2+1 |
| EC-110 | Computing Fundamentals | 2+1 |
| MTH-106 | Calculus-II | 3+0 |
| MTH-107 | Linear Algebra | 4+0 |
| Total Credit Hours | | 18 |

Semester-3

| Course code | Course Title | Credit Hrs |
|---------------------------|---|------------|
| HS-201 | Technical Report Writing | 3+0 |
| HS-403 | Management & Entrepreneurship | 3+0 |
| MTH-205 | Mathematical Computation with Software Packages | 2+1 |
| MTH-206 | Calculus-III | 3+0 |
| MTH-207 | Discrete Mathematics | 3+0 |
| MTH-208 | Mathematical Statistics-I | 3+0 |
| Total Credit Hours | | 18 |

Semester-4

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------------|------------|
| HS-402 | Economics | 2+0 |
| HS-404 | Foreign Language | 1+1 |
| MTH-209 | Group Theory | 3+0 |
| MTH-210 | Elementary Number Theory | 3+0 |
| MTH-211 | Ordinary Differential Equations-I | 3+0 |
| MTH-212 | Mathematical Statistics-II | 3+0 |
| Total Credit Hours | | 16 |

Semester-5

| Course code | Course Title | Credit Hrs |
|---------------------------|---|------------|
| HS-401 | Professional Values & Ethics | 2+0 |
| MTH-301 | Real Analysis –I | 3+0 |
| MTH-304 | Complex Analysis | 3+0 |
| MTH-305 | Metric and Topological Spaces | 3+0 |
| MTH-306 | Ordinary Differential Equations-II | 3+0 |
| MTH-308 | Differential Geometry and Tensor Analysis | 3+0 |
| Total Credit Hours | | 17 |

Semester-6

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------------|------------|
| MTH-307 | Partial Differential Equations | 3+0 |
| MTH-309 | Analytical Mechanics | 3+0 |
| MTH-310 | Functional Analysis | 3+0 |
| MTH-311 | Real Analysis –II | 3+0 |
| MTH-312 | Rings and Fields | 3+0 |
| HS-203 | Community Service | 0+1NC |
| Total Credit Hours | | 15 |

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------|------------|
| MTH-401 | Calculus of Variations | 3+0 |
| MTH-402 | Numerical Techniques | 3+0 |
| MTH-403 | Fluid Mechanics | 3+0 |
| MTH-xxx | E-1 | 3+0 |
| MTH-xxx | E-2 | 3+0 |
| Total Credit Hours | | 15 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|---|------------|
| MTH-404 | Integral Equations | 3+0 |
| MTH-405 | Mathematical Modeling with Applications | 3+0 |
| MTH-xxx | Project | 3+0 |
| MTH-xxx | E-3 | 3+0 |
| MTH-xxx | E-4 | 3+0 |
| Total Credit Hours | | 15 |



List of Elective Courses

| Course Code | Course Title |
|-------------|-----------------------|
| MTH-451 | Fuzzy Logic |
| MTH-452 | Advanced Group Theory |
| MTH-453 | Theory of Modules |
| MTH-454 | Analytical Dynamics |
| MTH-455 | Quantum Mechanics |
| MTH-456 | Algebraic Geometry |
| MTH-457 | Theory of Manifolds |

| Course Code | Course Title |
|-------------|--------------------------------------|
| MTH-458 | Functional Analysis-II |
| MTH-459 | Operations Research |
| MTH-460 | Optimization Theory |
| MTH-461 | Mathematical Modeling and Simulation |
| MTH-462 | Theory of Elasticity |
| MTH-463 | Electromagnetism |
| MTH-464 | Special Theory of Relativity |

Course Contents:

MTH-104: Elements of Set Theory and Mathematical Logic

Set theory, functions, computing cardinals, infinite sets, finite sets, countable sets and properties, Cantor-Bernstein theorem, relations, similarity of triangles, order relations, min, max, inf, sup, linear order, examples of: \mathbb{N} , \mathbb{Z} , \mathbb{R} , $P(A)$, well-ordered sets and induction, inductively ordered sets and Zorn's lemma, mathematical logic.

HS-103: Communication Skills

For contents, please refer to page number 24.

MTH-105: Calculus-I

Real numbers system, intervals inequalities, absolute values, coordinates and graphs. functions, logarithmic, exponential, hyperbolic and inverse hyperbolic functions, real valued functions their operations and graphs, limits, continuity, differentiation, techniques of differentiation, implicit differentiation, applications of derivatives, mean value theorem, maxima and minima, higher order derivatives and Leibniz rule, anti-derivatives and techniques of integration, fundamental theorem of integral

calculus, definite integral and applications of definite integral.

MTH-106: Calculus-II

Infinite sequences and series and their convergence, different tests, alternating series, absolute and conditional convergence of series, power series and its applications, Taylor and Maclaurin series, conic section, tangents and normal to the conics in rectangular, cylindrical and spherical coordinates, parameterization of plane curves, quadric surfaces, coordinate system, dot product, cross product, vector-valued functions, derivatives and integrals of vector valued functions, arc length, curvature, normal and binormal vectors.

MTH-107: Linear Algebra

System of linear equations, solution of linear system, Gauss-Jordan method, Gaussian elimination, determinants, vector spaces, subspaces, linear combination and spanning, linearly independence and dependence, bases and dimension, kernel and image of a linear mapping, rank and nullity, reflections, projections, change of basis, eigen values and eigenvectors, theorem of Hamilton-Cayley,

inner product spaces, orthogonal and orthonormal basis, Gram Schmidt process, diagonalization, quadratic forms.

MTH-205: Mathematical Computation with Software Packages

MATLAB: Introduction to MATLAB syntax, variables, strings vectors, matrices, basic program writing in MATLAB, loops (do, for, while, if), symbolic toolbox, array operations, solving systems of linear equations, two and three dimensional plots in MATLAB. animations in MATLAB, MATHEMATICA: Introduction to the basic environment of MATHEMATICA and its syntax, running MATHEMATICA and numerical/algebraic calculations, symbolic mathematics in MATHEMATICA, functions and programs, graphics, MAPLE: Introductory demonstration of MAPLE, vectors and matrices formations, toolbars and palettes, operators, constant, elementary functions, plots of 2D and 3D functions, packages within MAPLE.

MTH-206: Calculus-III

Multivariable functions and partial derivatives, directional derivatives and the gradient vector, optimization problems, Lagrange multipliers, multiple integrals, applications of double and triple integrals, change of variables in multiple integrals, vector calculus, divergence theorem, Stokes' theorem.

MTH-207: Discrete Mathematics

Introduction to logic, quantifiers and conditional statements, proofs, valid and invalid arguments, predicates and quantified statements, arguments with quantified statements, direct proofs, counterexamples, quotient-remainder theorem, floor and ceiling functions, irrationality of some square roots, mathematical induction, strong induction, set theory, set properties, partitions, power sets, recursively defined sequences, solving recurrences by iteration, Big Oh notation, efficiency of algorithms, exponential and logarithmic functions, relations, equivalence relations, finite state automata, partial order relations, trees, graphs and graph theory.

MTH-208: Mathematical Statistics-I

Introduction of the course and counting techniques, sample space and events, axioms of probability, some simple propositions, probability as a continuous set function, probability as a measure of belief conditional probability and independence, conditional probability, Bayes's formula, independent events, random variables, discrete and continuous random variables, expected value, variance, Bernoulli and binomial distribution, Poisson distribution, geometric and negative binomial distribution, hypergeometric distribution, uniform continuous distribution, normal distributions, gamma distribution.

MTH-209: Group Theory

Groups, subgroup, cyclic groups, co-sets and Lagrange's theorem, normalizer, centralizer, center of a group, equivalence relation in a group, conjugacy classes, normal subgroups, quotient group, homomorphisms, isomorphism and automorphism, kernel and image of homomorphism, isomorphism theorems, permutations, cyclic permutations, Cayley's theorem, direct product of two groups.

MTH-210: Elementary Number Theory

Divisibility and factorization, fundamental theorem of



arithmetic, congruences, Chinese remainder theorem, Wilson's theorem, Fermat's theorem, Euler's theorem, arithmetic functions, multiplicative functions, Euler's phi-function, perfect numbers, moebius function, moebius inversion formula, quadratic residues and non-residues, Legendre symbol, law of quadratic reciprocity, primitive roots, order of an integer, primitive roots for primes, primitive root theorem, linear diophantine equations, pythagorean triples, representation of integers as sum of squares.

MTH-211: Ordinary Differential Equations-I

First order ordinary differential equations, separable variables, exact equation, homogeneous equations, integrating factors, nonlinear first order equation, second and higher order linear differential equations, superposition principle, homogeneous equations with constant coefficients, linear independence and Wronskian, UC method, variation of parameters, Cauchy-Euler equation, applications of second order differential equations, undetermined coefficients, Fourier series with periodic extensions, Gibbs phenomenon, half-range expansions, Fourier integrals.

MTH-212: Mathematical Statistics-II

Collection and presentation of sample data, sample mean, central limit theorem, distribution of the sample variance of a normal population, point estimator of a population mean, estimating a population variance, interval estimators of the mean of a normal population with known population variance, lower and upper confidence bounds, interval estimators of the mean of a normal population with unknown population variance, hypothesis tests and significance levels, tests concerning the mean of a normal population of known variance, one-sided tests, the t test for the mean of a normal population of unknown variance, hypothesis tests concerning two populations: testing equality of means of two normal populations of known variances, testing equality of means, unknown variances and large sample sizes, testing equality of means, small-

sample tests when the unknown population variances are equal.

MTH-301: Real Analysis-I

The real number system, basic properties of functions on R_1 , the intermediate-value theorem, least upper bound, greatest lower bound, the Bolzano–Weierstrass theorem, the boundedness and extreme-value theorems, uniform continuity, the Cauchy criterion, the Heine–Borel theorem, elementary theory of differentiation, elementary theory of integration, the Darboux integral for functions on R_1

MTH-304: Complex Analysis

Complex numbers, basic properties, De- Moivre's theorem, regions in the complex plane, functions of a complex variable, limits, continuity, derivatives, Cauchy-Riemann equations, analytic functions, trigonometric, hyperbolic and logarithmic functions, Cauchy-Goursat theorem, Cauchy-integral formula, derivatives of analytic functions, Liouville's theorem, maximum modulus principle, sequences and series, Taylor and Laurent series, residues and poles, Cauchy's residue theorem, Rouche's theorem, linear fractional transformations.

MTH-305: Metric and Topological Spaces

Sets, set operations, sequences and subsequences, topology of n-dimensional Euclidean space, metrics, pseudo-metrics and convergence of sequences, norms and normed spaces, open and closed balls, continuous functions, open sets, topologies and topological spaces, interior, closure and related concepts, continuous functions, homeomorphism and isometries, bases and sub-bases, subspaces, sequential compactness for metric spaces, compactness for topological spaces, equivalence of compactness and sequential compactness for metric spaces, connected and disconnected topological spaces and subsets.

MTH-306: Ordinary Differential Equations-II

Introduction to eigenvalue problem, adjoint and self adjoint operators, self adjoint differential equations, eigenvalues and eigen functions, Sturm-Liouville (S-L) boundary value problems, regular and singular S-L problems, properties of regular S-L problems series solutions: power series, ordinary and singular points, existence of power series solutions, power series solutions, types of singular points, series solution of differential equation, Frobenius theorem, existence of Frobenius series solutions, solutions about singular points, the Bessel, modified Bessel, Legendre, Hermite, hypergeometric equations and their solutions, Greens function for ordinary differential equations.

MTH-308: Differential Geometry and Tensor Analysis

Space curves, arc length, tangent, normal and binormal, osculating, normal and rectifying planes, curvature and torsion, the Frenet-Serret theorem, natural equation of a curve, involutes and evolutes, helices, fundamental

existence theorem of space curves, tangent plane and surface normal, the first fundamental form and the metric tensor, the second fundamental form, principal, Gaussian, mean, geodesic and normal curvatures, Gauss and Weingarten equations, Gauss and Codazzi equations, Einstein summation convention, tensors of different ranks, contravariant, covariant and mixed tensors, contraction theorem, quotient law, Christoffel symbols.

MTH-307: Partial Differential Equations

Partial differential equations, the Cauchy's problem for quasilinear first order PDEs, first order nonlinear equations, the vibrating string, the vibrating membrane, conduction of heat in solids, canonical forms and general solution, the Cauchy problem and wave equations: homogenous wave equations, initial-boundary value problems, equations with non-homogenous boundary conditions, vibration of finite string with fixed ends, non-homogenous wave equation, spherical and cylindrical wave equation, methods of separation of variables: solutions of elliptic, parabolic and hyperbolic, Dirichlet problem for a circle and circular



annulus, Neumann problem for a circle, nonhomogenous boundary value problems, Laplace transform, solution of PDEs by Laplace transforms, Fourier transform, convolution theorem of the Fourier transform, solutions of heat, wave and Laplace equations by Fourier transform, finite Fourier transform, Hankle transform and its applications.

MTH-309: Analytical Mechanics

Kinematics of particle and rigid body in three dimension; Euler's theorem, work, power, energy, conservative field of force, motion in a resisting medium, variable mass problem, moving coordinate system, rate of change of a vector, motion relative to the rotating earth, the motion of a system of particles, conservation laws, generalized coordinates, Lagrange's equations, Hamiltonian's equation, simple applications, motion of a rigid body, momental ellipsoid; equipomental systems, gyroscopic motion, Euler's dynamical equations, properties of a rigid body motion under no forces.

MTH-310: Functional Analysis

Metric spaces, open sets, closed sets, neighborhood, completeness of metric spaces, normed spaces and Banach spaces, vector space, properties of normed spaces, finite dimensional normed spaces and subspaces, compactness and finite dimension, linear operators bounded and continuous linear operators, linear functional, linear operators and functional on finite dimensional spaces, normed spaces of operators, dual spaces, inner product spaces and Hilbert spaces: inner product space, Hilbert space, properties of inner product spaces, orthogonal complements and direct sums, orthonormal sets and sequences, series related to orthonormal sequences and sets, total orthonormal sets and sequences.

MTH-311: Real Analysis-II

Partial derivatives and the chain rule, extended mean-value theorem, fundamental lemma of differentiation, Taylor's theorem, maxima and minima, multi-index,



binomial theorem, multinomial theorem, the directional derivative, Taylor theorem with remainder, the derivative in R^n , the Darboux integral in R^n , The Riemann integral in R^n , geometric series, comparison test, integral test, series of positive and negative terms, absolute and conditional convergence, ratio, root, comparison and integral tests, uniform convergence of series, improper integrals, the Leibniz rule, convergence and divergence of improper integrals the Riemann–Stieltjes integral.

MTH-312: Rings and Fields

Rings, quadratic integer rings, non-commutative rings, the Hamilton quaternions, polynomial rings, matrix rings, subrings, ideals, maximal and prime ideals, left, right and two-sided ideals, the ideal generated by a set, quotient rings, ring homomorphism, the isomorphism theorems, finitely generated ideals, rings of fractions integral domain, divisibility in integral domains, greatest common divisor, least common multiple, the Euclidean algorithm, principal ideal domains, prime and irreducible elements in an integral domain, Gauss lemma, unique factorization domains, finite fields, symmetric polynomials and fundamental theorem of symmetric polynomials.

MTH-401: Calculus of Variations

The Euler-Lagrange equation, no explicit y dependence, no explicit x dependence, and degenerate cases, invariance of the Euler-Lagrange, two independent variables, the inverse problem, the finite-dimensional case and Lagrange multipliers, single constraint, multiple constraints abnormal problems, the isoperimetric problem, some generalizations on the isoperimetric, holonomic and nonholonomic constraints, natural boundary conditions, transversality conditions, the Hamiltonian formulation, the Legendre transformation, equations, symplectic maps, the Hamilton-Jacobi equation, the general problem, conservative systems, separation of variables.

MTH-402: Numerical Techniques

Loss of significance and error propagation, condition and instability, error estimation, floating point arithmetic, existence and uniqueness of the interpolating polynomial, Lagrangian interpolation, the divided difference table, error of the interpolating polynomial, interpolation with equally spaced data, Newton's forward and backward difference formulas, Bessel's interpolation formula, hermite interpolation, bisection method, secant method, fixed point iteration, Newton-Raphson method, order of convergence of Newton-Raphson and secant methods, triangular factorization, Crout method, Jacobi method, Gauss-Seidel method, SOR method, numerical differentiation formulae based on interpolation polynomials, error estimates, Newton-Cotes formulae, trapezoidal rule, Simpson's formulas, Romberg improvement, Richardson extrapolation, error estimates of integration formulas, Gaussian quadrature.

MTH-403: Fluid Mechanics

Real fluids and ideal fluids, streamlines and pathlines, steady and unsteady flows, velocity potential, vorticity vector, local and particle rates of change, equation of continuity, Euler's equations of motion, Bernoulli's equation, Navier-Stokes' equations steady motion under conservative body forces, impulsive motion, sources,

sinks and doublets, images in rigid infinite plane and solid spheres, axi-symmetric flows, Stokes' stream function, incompressible flow, complex velocity potential for uniform stream, line sources and line sinks, Milne-Thomson circle theorem, Blasius theorem, conformal transformation and Schwartz-Christoffel transformation, vortex rows, Kelvin's minimum energy theorem, uniqueness theorem, Helmholtz vorticity equation, Karman's vortex-street.

MTH-404: Integral Equations

Linear integral equations, special types of kernel, square integrable functions and kernels, singular integral equations, non-linear equations, connection with differential equations, linear differential, Green's function, integral equations of the convolution type, integral transforms, Fredholm equation of the first and second kind, Volterra equation of first and second kind, method of successive approximations, Neumann series, iterates and the resolvent kernel, integral equations with singular kernels, Green's functions in two and three dimensions, Dirichlet's problem, Poisson's formula for the unit disc, Bacher's example, degenerate kernels, approximation by degenerate kernel, Fredholm's theorems, Fredholm formulae for continuous kernels, bounds on characteristic values, positive kernels, Mercer's theorem, variational principles, Rayleigh-Ritz variational method.

MTH-405: Mathematical Modeling with Applications

Introduction, radiometric dating, the age of uranium in our solar system, the age of the universe, carbon dating, epidemic modeling, stability and asymptotic stability, Newton and Leibniz, vector calculus, rewriting Kepler's law mathematically, generalizations, Newton and elliptic orbit, population models, growth and decay, logistic equation, qualitative analysis, harvesting models, economic considerations, depensation growth models. the nonlinear system and its linearization, fundamental theorem of stability, Lotka-Volterra predator-prey model, Harvesting of predator and prey, indiscriminate spraying of insects.

Elective Courses

MTH-451: Fuzzy Logic

Examples of fuzziness, modeling of fuzziness, operations on fuzzy sets, fuzziness as uncertainty, boolean algebra and lattices, equivalence relations and partitions, composing mappings, isomorphism and homomorphism, α cuts, images of α level sets, fuzzy quantities, fuzzy numbers, fuzzy intervals, t -norms, generators of t -norms, isomorphism of t -norms, negations, t -conorms, strict De-Morgan systems, nilpotent De-Morgan systems, no uniqueness of negations in strict De-Morgan systems, fuzzy implications, averaging operators and negations, averaging operators and nilpotent t -norms, De-Morgan systems with averaging operators, power of t -norms, sensitivity of connectives, binary fuzzy relations, operations on fuzzy relations.

MTH-452: Advanced Group Theory

Actions of groups, permutation representation, equivalence of actions, regular representation, cosets spaces, linear groups and vector spaces, affine group and affine spaces, transitivity and orbits, partition of G -spaces into orbits, orbits

as conjugacy class computation of orbits, the classification of transitive G -spaces catalogue of all transitive G -spaces up to G -isomorphism, one-one correspondence between the right coset of Ga and the G -orbit, G -isomorphism between coset spaces and conjugation in G , simplicity of A_5 , Frobenius-Burnside lemma, G -invariance, relationship between morphisms and congruences, order preserving one-one correspondences between congruences on Ω and subgroups H of G that contain the stabilizer G_a , the alternating groups, linear groups, projective groups, Mobius groups, orthogonal groups, unitary groups, Cauchy's theorem, P -groups, Sylow P -subgroups, Sylow theorems, simplicity of A_n when $n > 5$.

MTH-453: Theory of Modules

Motivations to modules, submodules, quotient modules, finitely generated and cyclic modules, exact sequences and elementary notions of homological algebra, noetherian and artinian rings and modules, radicals, semi simple rings and modules.



MTH-454: Analytical Dynamics

Constraints, generalized co-ordinates, generalized forces, general equation of dynamics, Lagrange's equations, conservation laws, ignorable co-ordinates, explicit form of Lagrange's equation in terms of tensors, Hamilton's principle of least action. Hamilton's equations of motion, Hamilton-Jacobi method, Poisson brackets (P.B's), Poisson's theorem, solution of mechanical problems by algebraic technique based on (P.B's) small oscillations and normal modes, vibrations of strings, transverse vibrations normal modes, forced vibrations and damping, reflection and transmission at a discontinuity, longitudinal vibrations, Rayleigh's principle.

MTH-455: Quantum Mechanics

State vectors, formal properties of quantum mechanical operators, simple harmonic oscillator, Schrodinger representation, Heisenberg equation of motion, Schrodinger equation, potential step, potential barrier, potential well, orbital angular momentum, motion in a centrally symmetric field, hydrogen atom, matrix representation of angular momentum and spin, time independent perturbation theory, degeneracy, the Stark effect.

MTH-456: Algebraic Geometry

Affine algebraic varieties, Hilbert basis theorem, decomposition of variety into irreducible components, Hilbert's nullstellensatz, the spectrum of a ring, projective variety and the homogeneous spectrum, functions and morphisms, rings and modules of fractions and their properties, coordinate ring and polynomial functions, polynomial maps, regular and rational functions, morphisms, rational maps, dimension: the Krull dimension of topological spaces and rings, prime ideal chain and integral extensions, the dimension of affine algebras and affine algebraic varieties, the dimension of projective varieties, the product of varieties, on dimension, tangent space and smoothness, completeness.

MTH-457: Theory of Manifolds

Manifolds and smooth maps, derivatives and tangents, the inverse function theorem and immersions, submersions, transversality, homotopy and stability, embedding manifolds in Euclidean space, manifolds with boundary, one manifolds and some consequences, exterior algebra, differential forms, partition of unity, integration on manifolds, exterior derivative, cohomology with forms, Stoke's theorem, integration and mappings, the Gauss-Bonnet theorem, Lie groups as examples of manifolds, their Lie algebras.

MTH-458: Functional Analysis-II

The Hahn-Banach theorem, principle of uniform boundedness, open mapping theorem, closed graph theorem, weak topologies and the Banach-Alouglu theorem, extreme points and the Krein-Milman theorem, the dual and bidual spaces, reflexive spaces, compact operators, spectrum and eigenvalue, of an operator, elementary spectral theory.

MTH-459: Operations Research

Linear programming: linear programming, formulations and graphical solution, simplex method, M-technique and two-phase technique, duality and sensitivity analysis, the dual problem, primal-dual relationships, dual simplex method, sensitivity and post optimal analysis, transportation models, north-west corner, least-cost and Vogel's approximations methods, the method of multipliers, the assignment model, the transshipment model, network minimization.

MTH-460: Optimization Theory

Introduction to optimization, relative and absolute extrema, concave and unimodal functions, constraints, optimization of one, two and several variables functions and necessary and sufficient conditions of their optima, optimization by equality constraints, direct substitution method and Lagrange multiplier method, necessary

and sufficient conditions for an equality constrained optimum with bounded independent variables, inequality constraints and Lagrange multipliers, Kuhn-Tucker theorem, multidimensional optimization by gradient method, convex and concave programming, generalized mathematical formulation of dynamics programming, non-linear continuous models, dynamics programming and variational calculus, Control theory

MTH-461: Mathematical Modeling and Simulation

Basic concepts of computer modeling in science and engineering using discrete particle systems and continuum fields, techniques and software for statistical sampling, simulation, data analysis and visualization, Monte Carlo, mesoscale and continuum methods to study fundamental physical phenomena encountered in the fields of computational physics, chemistry, mechanics, materials science, biology, and applied mathematics, applications drawn from a range of disciplines to build a broad-based understanding of complex structures and interactions in problems where simulation is on equal-footing with theory and experiment.

MTH-462: Theory of Elasticity

Cartesian tensors, analysis of stress and strain, generalized Hooke's law, crystalline structure, point groups of crystals, reduction in the number of elastic moduli due to crystal symmetry, equations of equilibrium, boundary conditions, compatibility equations, plane stress and plane strain problems, two dimensional problems in rectangular and polar co-ordinates, torsion of rods and beams.

MTH-463: Electromagnetism

Electrostatics and the solution of electrostatic problems in vacuum and in media, electrostatic energy, electric currents, the magnetic field of steady currents, magnetic properties of matter. magnetic energy, electromagnetic induction, Maxwell's equations, boundary value potential problems in two dimensions, electromagnetic waves, radiation, motion of electric charges.

MTH-464: Special Theory of Relativity

Historical background and fundamental concepts of special theory of relativity, Lorentz transformations (one dimensional), length contraction, time dilation and simultaneity, velocity addition formulae, 3- dimensional Lorentz transformations, introduction to 4-vector formalism, Lorentz transformations in the 4-vector formalism, the Lorentz and Poincare groups, introduction to classical mechanics, Minkowski space time and null cone, 4-velocity, 4-momentum and 4-force, application of special relativity to Doppler shift and Compton effect, particle scattering, binding energy, particle production and decay, electromagnetism in relativity, electric current, Maxwell's equations and electromagnetic waves, the 4-vector formulation of Maxwell's equations, special relativity with small acceleration.

Course Outlines of Compulsory/ General Courses

IS-211: Islamic Studies

For contents, please refer to page number 172.

HS 404: Foreign Language

For contents, please refer to page number 30.

HS-401: Professional Values & Ethics

For contents, please refer to page number 173.

HS-101: English

For contents, please refer to page number 24.

HS-102: Pakistan Studies

For contents, please refer to page number 173.

HS-103: Communication Skills

For contents, please refer to page number 24.

HS-201: Technical Report Writing

For contents, please refer to page number 25.

HS-402: Economics

For contents, please refer to page number 28.

HS-403: Management & Entrepreneurship

For contents, please refer to page number 29.

CS-101: Introduction to Information and Communication Technologies

For contents, please refer to page number 105.

EC-110 Computing Fundamentals

For contents, please refer to page number 77.

PHY-101: Introduction to Mechanics

Units of physical quantities (SI Units), motion of objects in one, two and three dimensions, Newton's laws of motion, gravitation, Kepler's laws, work done by constant and variable forces (conservative and non-conservative), power, work and potential energy, isolated systems and conservation of mechanical energy, work done by external forces and conservation of energy, motion of a system of particles and extended rigid bodies, center of mass and Newton's laws for a system of particles, linear momentum, impulse, momentum & kinetic energy in one and two dimensional, elastic and inelastic collisions, rigid bodies, conservation laws, rotation about a fixed axis, angular motion (displacement, velocity and acceleration, work, power), rotational inertia, parallel-axis theorem, torque and Newton's law for rotation, rolling motion, angular momentum for a single particle and a system of particles and its conservation, static equilibrium involving forces and torques, rotational inertia of various shapes i.e. for disc, bar and solid sphere, elasticity, stress, strain and properties of materials, angular velocity, conservation of

angular momentum, effects of torque and its relation with angular momentum, amplitude, phase, angular frequency, velocity and acceleration in SHM, linear and angular simple harmonic oscillators, energy in SHM, simple pendulum, physical pendulum, SHM and uniform circular motion, static fluids and pressure, Archimedes' principle, fluid dynamics, equation of continuity and Bernoulli's principle.

PHY-102: Electricity and Magnetism

Electrostatics, electric potential, capacitors and capacitance, cylindrical and spherical capacitors, capacitors in series and parallel, energy stored in an electric field, dielectrics and Gauss' law. DC circuits, electric current and current density, resistance and resistivity, ohm's law, power in electric circuits, semiconductors and superconductors, work, energy, and EMF, resistances in series and parallel, single and multiloop circuits, Kirchhoff's rules, RC circuits, charging and discharging of a capacitor, magnetic field and magnetic Force, hall effect, magnetic force on a current carrying wire, torque on a current loop, magnetic dipole moment, magnetic field due to a current, force between two parallel currents, ampere's law, biot-savart law, magnetic field due to a current, solenoids and toroids, a current-carrying coil as a magnetic dipole, inductance, faraday's law of induction, Lenz's law, induction and energy transfers, induced electric fields, inductors and inductances, self-inductance.

MS Mathematics

This program requires a coursework of 24 credit hours. 6 additional credit hours are also required to be completed either through research and submission of a thesis and its successful defense or by taking two additional courses in lieu of the thesis. This program imparts specialized knowledge in various areas of Mathematics and exposes the students to latest developments. Special efforts are made to nurture and enhance the research capabilities of students through seminars, workshops and critique sessions. Typical research topics for MS students are Numerical Analysis, Analytical and Numerical techniques for Ordinary & Partial Differential Equations and Finite Element Analysis. Research opportunities are also available in Numerical Linear Algebra, Mechanics of Fluids (Newtonian and Non-Newtonian), Computational Fluid Dynamics and Computational Rheology.



PhD Mathematics

The Doctor of Philosophy (PhD) in Mathematics is the highest degree awarded by the Department. The program comprises 18 credit hours of course work and 30 credit hours of research thesis. The courses are selected in consultation with the Supervisor. The progress of student is continuously monitored through the Guidance and Evaluation Committee (GEC).

The students eligible for admission in PhD program should possess an MS/MPhil Degree with a minimum CGPA 3 out of 4 and should have passed GAT (Subject) examination as per requirement of HEC, in vogue. The completion of course work is followed by Comprehensive Examination for granting candidacy as a PhD scholar.

The program necessitates two years of residency in HITEC University. The PhD thesis is evaluated by one local and two foreign experts from technologically more advanced countries. As per requirement of the HEC after positive evaluation from these experts, the PhD scholar is required to undertake an open defense to fulfill the degree requirements.

The degree is awarded in recognition of high level of scholarship, the ability to carry out independent research, and the publication of research in national and international journals of repute. The department sponsors research activities involving analytic and numerical solutions of Ordinary & Partial Differential Equations, Finite Element Analysis, Numerical Linear Algebra, Newtonian and Non-Newtonian Fluid Mechanics and Computational Fluid Dynamics etc.

List of Courses

| Course Code | Course Title | Credit Hours | Course Code | Course Title | Credit Hours |
|-------------|--|--------------|-------------|--|--------------|
| MTH-801 | Perturbation Methods-I | 3+0 | MTH-829 | Fractional Calculus & Applications | 3+0 |
| MTH-805 | Mathematical Modeling | 3+0 | MTH-831 | Numerical Solution of Boundary Value Problems for ODEs | 3+0 |
| MTH-806 | Mathematical Essentials for Cryptography | 3+0 | MTH-832 | Advanced Fluid Mechanics | 3+0 |
| MTH-807 | Relativistic Astrophysics | 3+0 | MTH-833 | Non-Newtonian Fluid Mechanics | 3+0 |
| MTH-808 | Advanced Ordinary Differential Equations with Applications | 3+0 | MTH-834 | Numerical Optimization and Applications | 3+0 |
| MTH-809 | Advanced Numerical Analysis | 3+0 | MTH-835 | Integral Transforms and their Applications | 3+0 |
| MTH-810 | Numerical Linear Algebra | 3+0 | MTH-836 | Turbulence Modeling | 3+0 |
| MTH-812 | Computational Fluid Dynamics | 3+0 | MTH-837 | Thermal and Concentration Boundary Layer | 3+0 |
| MTH-815 | Boundary Value Problems-I | 3+0 | MTH-838 | Mathematical Theory of Elastodynamics | 3+0 |
| MTH-817 | Integral Equations and Applications | 3+0 | MTH-839 | Advanced Numerical Techniques* | 3+0 |
| MTH-818 | Advanced Partial Differential Equations and Applications | 3+0 | MTH-840 | Mathematical Theory of Liquid Chromatography | 3+0 |
| MTH-820 | Variational Inequalities and Applications | 3+0 | MTH-841 | Statistical Mechanics | 3+0 |
| MTH-821 | Numerical Solution of Partial Differential Equations | 3+0 | EM-501 | Topics of Engineering for Mathematicians | 3+0 |
| MTH-823 | Finite Element Analysis-I | 3+0 | MTH-869 | Thesis (MS level) | 6+0 |
| MTH-824 | Advanced Numerical Linear Algebra | 3+0 | MTH-886 | PhD Thesis | 30+0 |
| MTH-826 | Advanced Mathematical Physics | 3+0 | | | |
| MTH-828 | Advanced Cryptography | 3+0 | | | |

*Only for Engineering Disciplines

Courses offered to other Departments

| Course Code | Course Title | Credit Hours |
|-------------|------------------------------------|--------------|
| MT-101 | Calculus and Analytic Geometry | 3+0 |
| MT-103 | Differential Equations | 3+0 |
| MT-104 | Linear Algebra and Vector Calculus | 2+0 |
| MT-201 | Complex Variables and Transforms | 3+0 |
| MT-202 | Numerical Methods | 2+1 |
| MT-203 | Linear Algebra | 3+0 |
| MT-204 | Multivariable Calculus | 3+0 |
| MT-302 | Probability and Statistics | 3+0 |
| MT-303 | Applied Linear Algebra | 2+0 |

MT-101: Calculus and Analytic Geometry

Functions and graphs, limits & continuity, differentiation and applications, extreme values of a function, differentials and approximation, indeterminate forms, Leibnitz theorem, integration, rules of integration, applications of definite integrals, length of a plane curve, volumes of solids of revolution, conic sections, infinite sequences and series, vectors in 3-dimensional space, vector valued functions and motion in space, analytical geometry in 3-dimensional space, functions of several variables, partial derivatives, tangent planes and normal lines, extrema of functions of two variables.

MT-104: Linear Algebra and Vector Calculus

Algebraic properties of matrices, elementary row operations, echelon form of a matrix, rank of a matrix, inverse of a matrix, solving linear system with Gauss elimination method, application of linear systems, determinants, Cramer's rule and applications, Vector calculus, vectors in 2-space and 3-space, vector product, arc length, gradient of scalar field, directional derivative, divergence and curl of vector field, line integrals, surface integrals, vector integrals, Green's theorem, divergence theorem of Gauss, Stokes' theorem.

MT-103: Differential Equations

Introduction to differential equations, exact and non-exact differential equations: Initial value problem, separable equations, homogeneous equations, exact equations, integrating factors, orthogonal trajectories. applications of first-order differential equations: nonlinear equations, Bernoulli's equation, Riccati equation, Clairaut equation, linear differential equation of higher order: Cauchy-Euler's equation, reduction of order, Wronskian, applications of 2nd order differential equations. Partial differential equations: one dimensional heat equation, higher dimensional heat equation, one dimensional wave equation, higher dimensional wave equation, Laplace and Poisson equation, Laplace transform and applications.

MT-201: Complex Variables and Transforms

Complex analysis, polar form of complex numbers, complex functions, their derivatives, analytic functions, Cauchy-Riemann equations, Laplace equation, line integral in the complex plane, Cauchy's integral theorem, Functions given by power series, Taylor and Maclaurin series. Vector calculus, Vectors in 2-space and 3-space, vector product, arc length, gradient of a scalar field, directional derivative, divergence of a vector field, curl of a vector field, line integrals, Green's theorem in the plane, divergence theorem of Gauss, Stokes theorem. Fourier Series, periodic functions, even and odd functions, half-range expansions, Fourier transforms, solution of differential equations.

MT-202: Numerical Methods

Solving nonlinear equations (bisection method, Newton-Raphson method, Horner's method, method of false position, secant method), Solving non-linear system of equations, Interpolation with equal interval of arguments (Newton formulas), unequal interval of arguments (Divided difference interpolation formula) Lagrange interpolation, numerical differentiation, numerical Integration (Newton-



Cotes), solving first order ODEs (Euler and Heun's methods, predictor-corrector methods, Runge-Kutta methods, solving system of first order ODEs, Solution of second order ODEs.

MT-203: Linear Algebra

Basic matrix operations, linear system of equations, Gauss elimination, linear models in science and engineering, linear dependence and independence of vectors, rank of a matrix, homogeneous and non homogeneous systems, determinants and their proper-ties, Cramer's Rule, inverse of a matrix, Gauss-Jordan elimination method, Decomposition of matrices (LU, Doolittle, Crout), vector spaces, inner product spaces, linear transformations, Eigen values and Eigen vectors, orthogonal matrices, orthogonal transformations, diagonalization of matrices, quadratic forms.

MT-204: Multivariable Calculus

Functions of several variables, partial derivatives of first and higher order, tangent planes and differentials,

extreme values and saddle points. Multiple integrals: 3 dimensions, vector functions: arc length and unit tangent vector, curvature and unit normal vector N , torsion and unit binormal vector B . Vector Calculus: line integrals, vector fields, work, circulation and flux, conservative fields, Green's theorem, curl and divergence, parametric surfaces and their areas, surface integrals, the divergence theorem of Gauss, Stokes' theorem.

MT-302: Probability and Statistics

Descriptive statistics, measures of central tendency, probability, conditional probability, multiplicative rules, random variables, discrete random variables and probability distributions, continuous probability distributions, joint probability distributions, mathematical expectation, mean, variance and covariance of random variables, Chebyshev's theorem, discrete uniform distributions, binomial distribution, Poisson distribution, normal distribution, estimation (point estimates and confidence intervals), test of hypothesis (what is hypothesis testing, errors in hypothesis testing, one-tailed and two-tailed tests of significance, sample tests of hypothesis about population mean, two-sample tests of hypothesis), regression and correlation.

MT-303: Applied Linear Algebra

Algebraic properties of matrices, elementary row operations, echelon form of a matrix, rank of a matrix, inverse of a matrix, solving linear system with gauss elimination method, application of linear systems, determinants, Cramer's rule and applications, vectors in Euclidean space, norm of a vector, distance between two vectors, orthogonal vectors, orthogonal projections, inner product, Eigenvalues and Eigenvectors, characteristic polynomials, quadratic forms, quadratic forms and Eigenvalues.

Department of Physics

The rapid progress in science during the recent decades was possible and achievable due to discoveries and inventions bred in the various fields of Physics; and this advent of scientific and technological advancements has underpinned scientific revolution, has rendered a noticeable change in our lives and throughout the world, and taking a central position in the educational paradigms, has facilitated the development and emergence of scientific disciplines coupled with exciting and challenging subjects.

The Department of Physics established recently at HITEC University, with the aim to provide sound knowledge and profound understanding of theoretical and practical aspects as a discipline at undergraduate level and to complement the basic and comprehensive knowledge of Applied Physics and Engineering Physics of the BS level engineering students, will foster cadres of technically, technologically, and intellectually literate and qualified professionals to meet the future needs of the national and international industries, academia, research organizations, targeted job market, and many other exigent careers.

The department is going to launch an HEC approved four year BS-Physics program, spanning over eight semesters, in Fall-2020. The program will be instrumental in producing

physicists, enriched with concrete knowledge in a broad range of fields like Solid State Physics, Quantum Mechanics, Computational Physics, Nuclear Physics, Plasma Physics, Thermal and Statistical Physics, Material Sciences, Surface Physics, and Digital Electronics.

At HITEC, apart from the course work, the students will be encouraged to carry out knowledge-centered research in novel and innovative areas of Physics; and accordingly, all students will be required to write a research thesis or to design a Final Year Project to orient them to the core concepts and their applications, to help them find the solutions to their problems through logical reasoning and rigorous argument; and to help them learn latest experimental techniques, and thus earn the BS-Physics degree.

And, as is the need of the day, the Department of Physics at HITEC University aims at developing conducive environment for learning, providing best possible facilities, laboratories, and development activities, and fostering and maintaining high level of ethical and professional standards by inculcating moral and ethical values, integrity, leadership, and tolerance in the students and helping them in becoming potentially rich and socially confident humans, Muslims, and citizen of Pakistan.



BS Physics

The Bachelor in Physics Program at HITEC University provides an excellent opportunity for undergraduate degree in Physics. Here in this program, undergraduate student is exposed to study a variety of subjects: Fundamentals of Physics, Mechanics, Electricity and magnetism, Quantum Mechanics, Mathematics, Optics, Materials Science, High Energy Physics, Bio-physics, Semiconductors, Nuclear Physics, etc. Interdisciplinary topics are also offered in this program as an optional course.

The emphasis in HITEC University is on problem solving skills with prime focus on fundamental concepts. Latest undergraduate labs are available where students learn/understand the practical aspects of the theoretical subjects taught in lectures. A lot of opportunities for undergraduate students are designed in the Department of Physics to participate in research activities. This program enables students to have a better learning atmosphere with hands on experience. Hence this undergraduate program offers both the theoretical and research aspects efficiently.

Curriculum

Semester-1

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------|------------|
| HS-101 | English | 3+0 |
| EC-110 | Computing Fundamental | 2+1 |
| STAT-108 | Statistics | 3+0 |
| IS-211 | Islamic Studies | 2+0 |
| HS-102 | Pakistan Studies | 2+0 |
| PHY-101 | Mechanics-I | 3+1 |
| PHY-102 | Physics Lab | 0+1 |
| Total Credit Hours | | 18 |

Semester-2

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------|------------|
| HS-103 | Communication Skills | 3+0 |
| MATH-106 | Basic Mathematics | 3+0 |
| PHY-103 | Electricity and Magnetism-I | 3+1 |
| PHY-104 | Waves and Oscillations | 3+0 |
| PHY-105 | Mechanics-II | 3+1 |
| Total Credit Hours | | 17 |

Semester-3

| Course code | Course Title | Credit Hrs |
|---------------------------|-------------------------------|------------|
| MT-103 | Differential Equations-I | 3+0 |
| HS-403 | Management & Entrepreneurship | 3+0 |
| PHY-201 | Electricity and Magnetism-II | 3+1 |
| PHY-202 | Modern Physics | 3+0 |
| PHY-203 | Optics | 3+0 |
| Total Credit Hours | | 16 |

Semester-4

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------------|------------|
| HS-402 | Economics | 2+0 |
| HS-404 | Foreign Language | 1+1 |
| MTH-209 | Group Theory | 3+0 |
| MTH-210 | Elementary Number Theory | 3+0 |
| MTH-211 | Ordinary Differential Equations-I | 3+0 |
| MTH-212 | Mathematical Statistics-II | 3+0 |
| Total Credit Hours | | 16 |

Semester-5

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------------|------------|
| MT-104 | Ordinary Differential Equation-II | 3+0 |
| CHM-110 | Chemistry | 3+0 |
| ME-102 | Thermodynamics | 3+0 |
| PHY-204 | Basic Electronics | 3+1 |
| PHY-205 | Mathematical Method of Physics-I | 3+0 |
| Total Credit Hours | | 16 |

Semester-6

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------|------------|
| PHY-301 | Solid State Physics-II | 3+0 |
| PHY-302 | Quantum Mechanics-II | 3+1 |
| PHY-303 | Electrodynamics | 3+1 |
| EE-205 | Nuclear Physics | 3+0 |
| PHY-304 | Computational Physics | 2+1 |
| Total Credit Hours | | 17 |

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------------|------------|
| PHY-401 | Electrodynamics-II | 3+1 |
| PHY-402 | Atomic and Molecular Physics | 3+0 |
| PHY-403 | Plasma Physics | 3+0 |
| PHY-404 | Lasers | 3+0 |
| PHY-405 | Thermal and Statistical Physics | 3+0 |
| Total Credit Hours | | 16 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------------|------------|
| PHY-406 | Particle Physics | 3+0 |
| PHY-407 | Experimental Physics | 3+1 |
| PHY-408 | Thesis/ Final Year Project* | 6+0 |
| PHY-409 | Materials Sciences (Optional) | 3+0 |
| PHY-410 | Surface Physics (Optional) | 3+0 |
| PHY-411 | Digital Electronics (Optional) | 3+1 |
| Total Credit Hours | | 16 |



Course Contents:

PHY-101: Mechanics-I

Basic concept of Dimensions, Measurement, Vector Representation, Kinematics, Dynamics, linear and circular motion, Projectile Motion, Newton's Laws of Motion with respective Applications, Centripetal and Centrifugal forces, Newton Law of Gravitation, Gravitational Potential Energy, Escape Velocity, Kepler's Law, Momentum, Linear and Angular Momentum, Moment of Inertial and find of various shapes like disc and solid sphere, Torque and its relation with angular momentum, Simple Harmonic Motions, SHM and Circular Motion, SHM and Simple Pendulum, Damped Oscillation, Special Theory of Relativity, Postulates of Relativity and Lorentz Transformation.

PHY-103: Electricity and Magnetism-I

Electric Charge, Conductors and Insulators, Coulomb's Law, Electric Field due to point Charge, due to electric dipole, due to charge distributions, Electric Flux, Gauss's Law and its applications, Potential Energy due to Parallel plate, cylindrical and spherical capacitors, Capacitor in series and parallel, DC Circuits, Electric Current and Current Density, Resistance and Resistivity, Ohm's law, Semiconductor and Super capacitors, Single and Multiple-loop circuits, Kirchhoff's Law, Charging and Discharging of Capacitors. Crossed Electric and Magnetic Field and their Applications, Hall's Effects, Ampere's Law, Bio Savart Law, Inductance, Faraday law of Inductance, Self and Mutual Induction, Lenz's Law, RL Circuit, LC Oscillations, Damped oscillation in RLC Circuits, RLC Series Circuit, Spin and Orbital Magnetic Dipole Moment, Magnetism and its types, Properties of Magnetism.

PHY-104: Waves and Oscillations

Waves and its types, Progressive waves and its types, Superposition Principle, Stationary Waves, Interference of Waves, Beats, Diffraction of Waves, Double Slit

Experiment, Single-slit Diffraction, Plane Waves, law of Geometric Optics, Three Dimensional wave Equations, Fourier Transformations, Bandwidth, Heisenberg's Uncertainty Principle. Simple Harmonic Oscillations, LCR Circuit, Free and Forced Oscillation, Damped Harmonic Oscillation, Steady-State Behavior, Coupled Oscillation, Atomic and Lattice Vibrations, Normal Modes.

ME-102: Thermodynamics

Thermodynamic system, Surrounding and Boundaries. Type of system, Properties and state of the substance, Processes and Cycles, Zeroth Law of Thermodynamics, Consequence of Zeroth law of Thermodynamics. The state of the system at Equilibrium. Temperature, Kinetic theory of ideal gas, Work done on an ideal gas, Internal energy of an ideal gas, Laws of thermodynamics. Reversible and irreversible processes. Carnot theorem and Carnot engine. Heat engine, Refrigerators. Calculation of efficiency of heat engines. Thermodynamic temperature scale, Entropy and Second law of thermodynamics, Entropy and Probability. Thermodynamic Functions, Thermodynamic functions and applications. Low Temperature Physics, Joule-Thomson effect and its equations. Thermocouple, Seebeck's effect, Peltier's effect, Thomson effect. Statistical distribution and mean values, mean free path and microscopic calculations of mean free path. Distribution of Molecular Speeds, Distribution of Energies, Maxwell distribution, Maxwell Boltzmann energy distribution, Internal energy of an ideal gas, Brownian Motion, Legvan equation, Qualitative description.

HS-103: Communication Skills

For contents, please refer to page number 24.

PHY-201: Electricity and Magnetism-II

Force produced by current, Biot-Savart law, Ampere's

law and basic equation of density of magnetic flux, Vector potential and magnetic flux, Definition of potential having direction and application to the expression to magnetic flux, Magnetic Material, Magnetic flux under the existence of medium, Magnetization and magnetic field, boundary condition, Magnetic circuit, Electromagnetic induction, Lorenz force, Inductance, Self-inductance and mutual inductance, Energy accumulated in inductance, Work and energy by magnetic effect, Displacement current and Maxwell's equation and Wave equation, plane wave.

PHY-202: Modern Physics

Non-Classical Physics, Quantum Interference, Black Body radiations, Planck Quantization, Photoelectric Effect, Compton Effect, Pair Production, Production of X-Rays and its Properties, X-Ray Diffraction, Concept of Matter Waves, DE Broglie relationship, Particular nature of matter, Contributions of Faraday, Thomson's, Rutherford and Bohr, wave Packets and Wave Group, Dispersion, Frank-Hertz Experiment and Spectroscopy, Concept of Wave Function, Schrodinger's Equation, Schrodinger equation for a free particle, for a particle inside an infinite box. Quantum Mechanical Tunneling, Zeeman's Effect, the Hydrogen atom, Orbitals, Angular Momentum and Its Quantization, Pauli Exclusion Principle, Nuclear Reactions.

PHY-203: Optics

Huygens' Principle, Fermat's Principle, Law of Reflection and Refraction, Thin Lenses, Newtonian Equation for Thin Lenses, Thick Lens, Ray Transfer Matrices, Optical Instruments including simple Magnifiers, Telescope and Microscope, Chromatic and Monochromatic Aberrations, Spherical Aberrations, Distortions, Standing Waves, Beats, phase and group velocities, Two and Multiple Beam Interference, Dielectric Film, Fabry-Perot Interferometer, Resolving Power, Free Spectral Range, Jones Matrices, Production of Polarized Light, Dichroism, Brewster's Law,

Birefringence, Double Refraction, Fraunhofer Diffraction from a single Slit, Diffraction Grating, Fresnel Diffraction, Coherence of Holography, Basic Concept of Laser.

PHY-204: Basic Electronics

Semiconductor Diode, Metals, Insulators, Conduction in Silicon and Germanium, Forbidden Energy Band gap, n and p type semiconductors, Junction Diode, Diode Voltage-Current equation, Zener Diode, Light emitting Diodes, Photodiodes, Capacitance in the pn junctions, Rectification, Half and Full Wave Rectification, The Bridge Rectifier, Measurement of ripple Factor, The Capacitor Filter, The π Filter, The π -R Filter, Voltage Double Rectifying Circuit, Diode wave clippers, Diode Clamper, Superposition Theorem, Thevenin Theorem, Norton Theorem, Model for circuit, one and two port Network, Hybrid Parameter equivalent circuit, Power in decibels, Junction Transistor as an amplifier, DC Bias for the Transistor, Field Effect Transistor, Operational Amplifier.

PHY-205: Mathematical Method of Physics-I

Wave Equation, Diffusion Equation, Poisson's Equation, Schrodinger's Equation, General form of Solution and Particular solution (First order, inhomogeneous second order), Characteristics and existence of solution, Uniqueness of solutions, Separation of variables in Cartesian Coordinates, Superposition of separated solutions, Separation of variables in curvilinear coordinates, integral Transform Methods, Green's Function, Polar form of Complex number and De Moivre's theorem, Complex logarithms and Powers, Functions of Complex Variables, Cauchy-Riemann conditions, Power series in complex variables and analytic continuations with examples, multi-valued functions and branch cuts, Singularities and zeroes

of Complex Function, Complex Integration, Cauchy's Integral formula, Laurent series and Residues, Residue integration theorem, Definite integrals using contour integration.

PHY-301: Solid State Physics-I

Basics of Crystal Structure, Lattice, Fundamental types of Lattice, Symmetry operations, Position and orientation of planes, Diffraction of X-ray, Bragg's Law, Reciprocal Lattice, Ewald construction and Brillion Zone, Fourier Analysis, Quantization of Lattice vibrations, Phonon momentum, Inelastic Scattering by Phonons, Optical properties in Infrared Regions, Thermal Properties of Solids, Electrical properties of Metals, Fermi Dirac Distribution Function, Free Electron theory of Metals, Electrical Conductivity and Ohm's Law, Cyclotron Function.

PHY-302: Classical Mechanics

Review of Newtonian Mechanics, Galilean Transformation, Frame of Reference, Newton's Laws of motion, Generalized Coordinate and Constraints, D' Alembert's Principle and Lagrange equations, Hamilton's Principle, Integrals of Motion, Non conservative systems and generalized potential, canonical equations and transformation, Hamiltonian of a dynamical system, Poisson brackets, phase space and Liouville's Theorem, Kepler's Law, Stability of circular orbits, Hyperbolic orbits and Rutherford Scattering, The Euler angles, inertia tensor, Euler equation of motion, motion of torque-free symmetrical top, stability of rotational motion.

PHY-303: Quantum Mechanics-I

Fundamental ideas of quantum mechanics, Electromagnetic waves and photon, wave packets, particle in a time-independent scalar potential, Constraints imposed by uncertainty relations, one-dimensional Gaussian wave

packet, One-particle wave function space, state space and its representations, Dirac notation, observable, representations, Properties of linear operators, Unitary operators, Two-dimensional infinite well. Postulates and their physical interpretation, The superposition principle, Particle in an infinite potential well, Root-mean-square deviations of two conjugate observables, the density and evolution operators, Schrodinger and Heisenberg pictures, Gauge invariance, bound states of a particle in a potential well of arbitrary shape, unbound states of a particle in the presence of a potential well or barrier of arbitrary shape, quantum properties of a particle in a one-dimensional periodic structure. Spin $\frac{1}{2}$ And Two-Level Quantum Systems, Spin $\frac{1}{2}$ particles, Pauli matrices, diagonalization of a 2×2 Hermitian matrix, Spin $\frac{1}{2}$ density matrix, Spin $\frac{1}{2}$ particle in a static magnetic field and a rotating field, Magnetic resonance. Importance of Harmonic oscillator, Eigenvalues and eigenstates of the Hamiltonian, Isotropic three-dimensional harmonic oscillator, charged harmonic oscillator placed in a uniform electric field, coherent states, Normal 32 vibrational modes of coupled harmonic oscillators, vibrational modes of an infinite linear chain of coupled harmonic oscillators, phonons, one-dimensional harmonic oscillator in thermodynamics equilibrium at a temperature. General Properties of Angular Momentum in Quantum Mechanics, Particles in a Central Potential with related examples, Zeeman Effect, Magnetism and its types, study of some atomic orbitals, vibrational-rotational levels of diatomic molecules.

PHY-304: Mathematical Method of Physics-II

Group Theory, Transformations, Groups definition, Subgroups and Cayley's theorem, Cossets and Lagrange's theorem, Conjugate classes, Invariant subgroups, Factor groups, Homomorphism, Direct products, Mappings, Linear operators, Matrix representations, Group representations, Equivalent representations and characters, Construction

and addition of representations, Invariance of functions and operators, Unitary spaces and Hermitian matrices, Adjoint, Self-adjoint, Hilbert space, Reducibility of representations, Schur's lemmas, Orthogonality relations, Group algebra, Expansion of functions in basis of irreducible representations, Kronecker product, Symmetrized and anti-symmetrized representations, Adjoint and complex-conjugate representations, Real representations, Clebsch-Gordan series and coefficients, Application, Perturbation theory and coupled systems. Vector calculus, Change of basis, Cartesian tensor, order/rank of a tensor, tensor algebra, quotient law, pseudo tensors, Kronecker delta and Levi cevita, dual tensors, physical applications, integral theorems for tensors, non-Cartesian tensors, general coordinate transformations and tensors, relative tensors, Christoffel symbols, covariant differentiation, vector operators in tensor form, absolute derivatives along curves, geodesics.

PHY-305: Solid State Physics-II

Polarization, Depolarization, Local and Maxwell field, Lorentz field, Clausius-Mossotti relation, Dielectric Constant and Polarizability, Measurement of dielectric constant, ferro electricity and ferroelectric crystals, Phase Transitions, First and 2nd order phase transitions, applications. General properties of semiconductors, intrinsic and extrinsic semiconductors, their band structure, carrier statistics in thermal equilibrium, band level treatment of conduction in semiconductors and junction diodes, diffusion and drift currents, collisions and recombination times, Interaction of light with solids, Optical Properties of Metals and Non-Metals, Kramer's Koning Relation, Excitons, Raman Effect in crystals, optical spectroscopy of solids, Magnetic dipole moment and susceptibility, different kinds of magnetic materials, Langevin diamagnetic equation, Paramagnetic equation and Curie law, Classical and quantum approaches to paramagnetic

materials. Ferro-magnetic and anti – ferromagnetic order, Curie point and exchange integral, Effect of temperature on different kinds of magnetic materials and applications. Superconductivity, Zero-Resistance and Meissner Effect, Type I and Type II superconductors, Thermodynamic fields, Tow fluid model, London equations, BCS and Ginzburg Landau Theory, Vortex Behavior, Critical Current Density, Josephson effect and applications.

PHY-306: Quantum Mechanics-II

Total angular momentum in classical mechanics and in quantum mechanics, addition of two spin $\frac{1}{2}$ angular momenta and two arbitrary angular momenta, Clebsch-Gordon coefficients, Addition of spherical harmonics, vector operators, Wigner-Eckart theorem, Electric Multi-pole moments, Evolution of two angular momenta. Stationary Perturbation Theory, Perturbation of a non-degenerate level and a degenerate level, one-dimensional harmonic oscillator subjected to a perturbing potential, interaction between the magnetic dipoles of two spin $\frac{1}{2}$ particles, Van der Waals forces, volume effect and the influence of the spatial extension of the nucleus on the atomic levels, variational method, energy bands of electrons in solids. Applications of Perturbation Theory to Atomic Systems, Stark effect. Approximation methods for Time-Dependent problems, Sinusoidal or constant perturbation, Oscillations of a system between two discrete states, Rabi flopping, decay of discrete state, Fermi's golden rule. Identical particles, Permutation operators, The summarization postulate, Bosons and fermions, Pauli's exclusion principle, Electronic configurations, Spin isomers.

PHY-307: Electrodynamics-I

Coulomb's Law , Electric Field , Gauss's Law , Differential Form of Gauss's Law , Surface Distributions of Charges and Dipoles and Discontinuities in the Electric Field and Potential, Poisson and Laplace Equations, Green's



Theorem, Uniqueness of the Solution with Dirichlet or Neumann Boundary Conditions Formal Solution of Electrostatic Boundary-Value Problem with Green Function, Electrostatic Potential Energy and Energy Density, Capacitance, Relaxation Method for Two-Dimensional Electrostatic Problems. Method of Images, Point Charge, Conducting Sphere, Green Function for the Sphere, Orthogonal Functions and Expansions, Separation of Variables, Summation of Fourier Series, Fields and Charge Densities in Two-Dimensional Corners and Along Edges, Finite Element Analysis for Electrostatics. Laplace Equation in Spherical Coordinates, Legendre Equation and Legendre Polynomials, Azimuthal Symmetry, Bessel Functions, Boundary-Value Problems in Cylindrical Coordinates, Expansion of Green Functions in Spherical Coordinates, Solution of Potential Problems with the Spherical Green Function.

PHY-308: Nuclear Physics

Properties of Nucleus, Nuclear size, mass, binding energy, nuclear spin, magnetic dipole and electric quadrupole

moment, parity and statistics. Yukawa's theory of nuclear forces. Nucleon scattering, charge independence and spin dependence of nuclear force, isotopic spin. Liquid drop model, Fermi gas model, Shell model, Collective model. Theory of Alpha decay and explanation of observed phenomena, measurement of Beta ray energies, the magnetic lens spectrometer, Fermi theory of Beta decay, Neutrino hypothesis, theory of Gamma decay, multipolarity of Gamma rays, Nuclear isomerism. Conservation laws of nuclear reactions, Q-value and threshold energy of nuclear reaction, energy level and level width, cross sections for nuclear reactions, compound nucleolus theory of nuclear reaction and its limitations, direct reaction, resonance reactions.

PHY-309: Computational Physics

Introduction of the computer languages like Basic, C, Pascal etc. and known software packages of computation. Numerical Solutions of equations, Regression and interpolation, Numerical integration and differentiation. Error analysis and technique for elimination of systematic and random errors. Conceptual models, the mathematical models, Random numbers and random walk, doing Physics with random numbers, Computer simulation, Relationship of modeling and simulation. MATLAB.

Phy-401: Electrodynamics-II

Plane Waves in a Non-conducting Medium, Linear and Circular Polarization, Goos-Hanchen Effect, Frequency Dispersion Characteristics of Dielectrics, Conductors, and Plasmas, Simplified Model of Propagation in the Ionosphere and Magnetosphere, Magnetohydrodynamic Waves, Group Velocity, Illustration of the Spreading of a Pulse As It Propagates in Dispersive Medium, Kramers-Kronig Relations, Arrival of a Signal After Propagation Through a Dispersive Medium, Waveguides, Resonant Cavities, and Optical Fibers. Rayleigh's Scattering, Perturbation theory of scattering, Scattering by Gases and Liquids,



Attenuation in Optical Fibers, Spherical Wave Expansion of a Vector Plane Wave, Scattering of Electromagnetic Wave, Scalar Diffraction Theory, Vector Equivalents of the Kirchhoff Integral, Vectorial Diffraction Theory, Babinet's Principle of Complementary Screens, Diffraction by a Circular Aperture, Special Theory of Relativity, Postulates, Lorentz Transformation, Relativistic Momentum and Energy, Invariance of Electric Charge, Covariance of Electrodynamics, Transformation of Electromagnetic Fields, Relativistic Equation of Motion, Lagrange and Hamiltonian for a Relativistic Charged Particle in External Electromagnetic Fields, Motion in a Uniform, Static Magnetic Field, Motion in Combined, Particle Drifts in Non-uniform, Adiabatic Invariance of Flux Through Orbit of Particle, The Darwin Lagrangian, Lagrangian for the Electromagnetic Field, Proca Lagrangian.

PHY-402: Atomic and Molecular Physics

Bohr Model of Hydrogen Atom, Reduced Mass, Atomic Units and Wavenumbers, Energy Levels and Spectra, Schrodinger Equation for One-Electron Atoms, Quantum

Angular Momentum and Spherical Harmonics, Electron Spin, Spin-Orbit interaction. Levels and Spectroscopic Notation, Lamb Shift, Hyperfine Structure and Isotopic Shifts. Rydberg Atoms. Radiative Transition Rates, Dipole Approximation, Einstein Coefficients, Selection Rules, Dipole Allowed and Forbidden Transitions. Metastable Levels, Line Intensities and Lifetimes of Excited States, Shape and Width of Spectral Lines, Scattering of Radiation by Atomic Systems, Zeeman Effect, Stark Effect. Schrodinger Equation for Two-Electron Atoms, Para and Ortho States, Pauli's Principle and Periodic Table, Coupling of Angular Momenta, L-S and J-J Coupling. Ground and Excited States of Multi- Electron Atoms, Configurations and Terms, Structure of Molecules and Diatomic Molecules, Born-Oppenheimer Approximation. Electronic Spectra, Transition Probabilities and Selection Rules, Frank- Condon Principle, Effects of Symmetry and Exchange. Bonding and Anti-bonding Orbitals. Electronic Spin and Hund's Cases, Nuclear Motion, Selection Rules. Spectra of Triatomic and Polyatomic Molecules, Raman Spectroscopy, Mossbauer Spectroscopy.

PHY-403: Plasma Physics

Occurrence of plasma, Concept of temperature, Debye shielding, the plasma parameter, Criteria for plasma. Applications of Plasma Physics, Single-particle motion in electromagnetic field, Uniform and non-uniform E and B fields, Time-variant E and B fields, Fluid description of plasma, Wave propagation in plasma, Derivation of dispersion relations for simple electrostatic and electromagnetic modes, Introduction to Controlled Fusion, Basic nuclear fusion reactions, Reaction rates and power density, radiation losses from plasma, operational conditions.

PHY-404: Lasers

Spontaneous Emission, Absorption, Stimulated Emission, Pumping Schemes, Absorption and Stimulated Emission Rates, Absorption and Gain Coefficients, Resonance Energy Transfers. Properties of Laser Beam, Electronic Energy Levels, Molecular Energy Levels, Level Occupation at Thermal Equilibrium, Stimulated Transition, Selection Rules, Radiative and Nonradiative Decay, Semiconductor. Plane Parallel (Fabry-Perot) Resonator, Concentric (Spherical) Resonator, Confocal, Resonator, Generalized Spherical Resonator, Ring Resonator, Stable Resonators, Unstable Resonators. , Matrix Formulation of Geometrical Optics, Wave Reflection and Transmission at a Dielectric Interface, Stability Condition Standing and Traveling Waves in a two Mirror Resonator, Longitudinal and Transverse Modes in a Cavity, Multilayer Dielectric Coatings, Fabry-Perot Interferometer. Optical pumping, Electrical Pumping, Continuous Wave (CW) and pulsed Lasers, Solid State Lasers, Glass Lasers and Semiconductor Lasers: Homojunction Lasers Double-Heterostructure lasers, Gas lasers, Free-Electron and X-Ray Lasers. Laser Applications.

PHY-405: Thermal and Statistical Physics

Intensive and extensive quantities, thermodynamic variables, thermodynamic limit, thermodynamic transformations. Classical ideal gas, first law of thermodynamics, application to magnetic systems, heat and entropy, Carnot cycle. Second law of thermodynamics, absolute temperature, temperature as integrating factor, entropy of ideal gas. Conditions for equilibrium, Helmholtz free energy, Gibbs potential, Maxwell relations, chemical potential. First-order phase transition, condition for phase coexistence. Phase space, distribution function, microcanonical ensemble, the most probable distribution, Lagrange multipliers. Maxwell-Boltzmann distribution,

Transport phenomena, Quantum statistics. Photons, phonons, Debye specific heat, Bose-Einstein condensation, equation of state, liquid helium. Canonical and grand canonical ensembles, partition function, connection with thermodynamics, fluctuations. minimization of free energy, photon fluctuations, pair creation. The order parameter, Broken symmetry, Ising spin model, Ginsburg Landau theory, mean-field theory, critical exponents, fluctuation-dissipation theorem, correlation length, universality.

PHY-406: Particle Physics

Relativistic quantum mechanics, Klein Gordon and Dirac equations. Pauli and Weyl representations of gamma matrices, antiparticles, Majorana representation, left and right-handed particles, zitterbewegung. Continuous symmetries and the Norther theorem, space reflection, time reversal, charge conjugation, and other discrete symmetries. Scattering matrix, relation to cross sections, crossing symmetry, dispersion relations, Cutkosky rules. Minimal coupling to electromagnetic field, diagrammatic perturbation theory, Ruther, Moller, and Bhabha scattering. Introduction to the gauge principle, non-abelian transformations, The Parton model, deep inelastic scattering, running of the coupling constant, beta function, limitations of the perturbative approach. V-A Theory of weak interactions, beta decay, tests of C and P-violation, time reversal invariance, leptonic and semi leptonic decays. Spontaneous symmetry breaking, Goldstone theorem, Higgs mechanism, standard model, experimental tests of standard model of particle physics. Neutrino oscillations, mass matrices and mixing, tests for generations beyond three.

PHY-407: Experimental Physics

Vacuum Techniques, Gas Transport, Fore-Vacuum Pumps, Diffusion pumps, sorption pumps. Production of ultrahigh vacuum, Fundamental concepts, guttering pumps, Ion

pumps, Cryogenic pumps, Turbo molecular pumps. Measurement of total pressure in Vacuums Systems, Units pressure ranges, Manometers, Perini gauges, The McLoad gauges, Mass spectrometer for partial measurement of pressure. Design of high Vacuum system, Surface to Volume ratio, Pump Choice, pumping system design. Vacuum Components, Vacuum valves, vacuum Flanges, Liquid Nitrogen trap, Mechanical feed throughs & Electrical feed throughs Leak detection: Basic consideration, leak detection equipment, Special Techniques and problems, Repair Techniques, GM tubes, scintillation detector, channel Tron, photo multipliers, neutron detectors, alpha/beta detectors, x-rays/gamma detectors, cosmic rays detectors, Spectrographs and Interferometers. Sensors for temperature, pressure displacement, rotation, flow, level, speed, rotation position, phase, current voltage, power magnetic field, tilt, metal, explosive and heat. Electronics and Electronic Instruments, Computer Introduction, Data and Error Analysis.

PHY-410: Surface Physics (Optional)

Surface reactions, Heterogeneous catalysis, Semiconductor technology, Corrosion, Nanotechnology, Classification of solids, Crystal structure, Unit cell, Bravais lattices, Electronic Structure of Surfaces. Interference of Electron Waves, Quantum size effects, Quantum wells, Mechanical Quantum Wells, Quantum Wires, Chemist's Approach, Bonds to Bands. Nucleation and growth of nanostructures and films, Surface Magnetism and magnetic imaging, Diamagnetism, Para magnetism, Anti-Ferromagnetism, Magnetism in thin films, Kerr microscopy, Spin Polarized Photoemission, Magnetic Force Microscopy. Surface Study Techniques, Electron Spectroscopy, mean free path Koopman's Theorem, Spin orbit coupling effects, chemical shifts, binding energy, Auger Electron Spectroscopy, X-Ray Photo-electron Spectroscopy, Electron Analyzer, Electron optics, Scanning Tunneling



Microscopy, History, Theory, Electronics and applications. Geometric and Electronic Structure, Molecular Adsorption on Semiconductor Surfaces, Adsorption Properties of CO on Metal Single-Crystal Surfaces, Molecular or dissociative adsorption, Chemical bonding and Orientation, Adsorption Site as a function of coverage, Over layer long-range order, Ammonia Synthesis, Oxide Surfaces. Different types of semiconductors, Prototypes, intramolecular bonding, Van der Waals, electronic properties, polarization effects, Field effect Transistors, basics of excitonic solar cells.

PHY-411: Digital Electronics (Optional)

Review of Number Systems, Boolean algebra (De Morgan's theorem, simplification of Boolean expression by Boolean Postulates and theorem, K-maps and their uses). Do not care condition, Different codes, Parity in Codes, IC Logic Families, Different logic-based IC families, Combinational Logic Circuit, Memory Devices, Memory mapping techniques Micro Computers, addressing modes, Instruction set and their types, Intel Microprocessor Hierarchy Micro-controller/ Embedded System.

DEPARTMENT OF ISLAMIC STUDIES



Prof. Dr. Ali Asghar Chishti
Chairman

Established in 2008, the Department of Islamic Studies envisioned evolving into a center of excellence for producing religious scholars to revitalize the spirit of Islamic thought and scientific query. The curricula and syllabi of Islamic studies are designed to provide in depth knowledge of basic Islamic Sciences such as Al Quran, Al Hadith, Al Fiqh, Islamic history, Islamic thought, Seerah, Islamic culture and Islamic Civilization.

The objective of the program is to provide a thorough understanding of fundamental sources of Islam, to deal with present challenges and to create viable and logical solutions of contemporary problems.

The Department invites students to pursue BS, Master and PhD programs and offers the opportunity to study variety of courses which are aimed at producing researchers capable of dealing with

current and futuristic issues.

The Department motivates the students to work for cause of Islam. Our mission is to provide quality education in Islamic thought and culture to preach and propagate Islamic concepts and practices, transcending cultural and geographical boundaries.

The Department helps the students to acquaint themselves with the concept of convergence of Islam and sciences.



Faculty Members

Prof. Dr. Ali Asghar Chishti

Designation: Professor & Chairman ISD
Qualification: PhD Islamic Studies, University of the Punjab, Lahore
Contact: ali.asghar@hitecuni.edu.pk

Dr. FarhadUllah (HEC Approved Supervisor)

Designation: Associate Professor
Qualification: PhD Islamic Studies, University of Peshawar, Peshawar
Contact: farhadullah@hitecuni.edu.pk

Dr. Manzoor Ahmad Alazhari

Designation: Associate Professor
Qualification: PhD Legal Policy Al-Azhar University, Egypt. Post Doc. University of Oxford, UK
Contact: manzoor.ahmad@hitecuni.edu.pk

Dr. Rab Nawaz

Designation: Assistant Professor
Qualification: PhD (Tafsir and Quranic Sciences) International Islamic University, Islamabad
Contact: rab.nawaz@hitecuni.edu.pk

Dr. Ahmad Hassan

Designation: Assistant Professor
Qualification: PhD (Islamic Studies) National University of Modern Languages, Islamabad
E-Mail: ahmad.hassan@hitecuni.edu.pk

Mrs. Zahida Jabeen

Designation: Lecturer
Qualification: PhD International Relations (In Progress) NUML Islamabad, M.Phil (Peace and Conflict Studies), National Defense University, Islamabad
Contact: zahida.jabeen@hitecuni.edu.pk

Mrs. Ruqya Zubair

Designation: Lecturer
Qualification: MS (Islamic Studies), HITEC University, Taxila
Contact: ruqya.zubair@hitecuni.edu.pk

Mr. Babar Shehzad

Designation: Program Coordinator
Qualification: MS (Management Sciences) COMSATS University, Islamabad
Contact: coordinatorirer@hitecuni.edu.pk

Curriculum - BS Islamic Studies

Semester-1

| Course code | Course Title | Credit Hrs |
|-------------|---------------------------|------------|
| | Intermediate English I | NC |
| HS-104 | English I | 3+0 |
| MT-107 | Math/Stat-I | 3+0 |
| IS-101 | Tajwid Quran | 3+0 |
| AR-101 | Arabic Language | 3+0 |
| CS-101 | Computing Fundamentals | 2+1 |
| | Total Credit Hours | 15 |

Semester-2

| Course code | Course Title | Credit Hrs |
|-------------|---------------------------------------|------------|
| | Intermediate English II | NC |
| HS-103 | Communication Skills | 3+0 |
| IS-102 | Quranic Arabic | 3+0 |
| IS-103 | Study of Sirah of Holy Prophet (PBUH) | 3+0 |
| IS-105 | Introduction to Logic | 3+0 |
| HS-102 | Pakistan Studies | 2+0 |
| AR-102 | Arabic Language II (Comprehension) | 3+0 |
| | Total Credit Hours | 17 |

Semester-3

| Course code | Course Title | Credit Hrs |
|-------------|---|------------|
| | Intermediate Pak Studies | NC |
| IS-411 | Professional Ethics | 2+0 |
| AR-201 | Arabic Literature | 3+0 |
| IS-201 | Textual Study of Holy Quran-I | 3+0 |
| IS-202 | Islamic History | 3+0 |
| IS-203 | Ulum-al-Quran | 3+0 |
| IS-210 | Introduction to the selected topics of the Holy Quran | 3+0 |
| | Total Credit Hours | 17 |

Semester-4

| Course code | Course Title | Credit Hrs |
|-------------|-----------------------------------|------------|
| IS-204 | History and Compilation of Hadith | 3+0 |
| IS-205 | Textual Study of Holy Quran-II | 3+0 |
| HS-402 | Economics | 3+0 |
| IS-206 | History of Islamic Law | 3+0 |
| IS-208 | Al-Da'wah-wal-Irshad | 3+0 |
| IS-209 | History of Tafsir | 3+0 |
| | Total Credit Hours | 18 |

Semester-5

| Course code | Course Title | Credit Hrs |
|-------------|---------------------------------------|------------|
| IS-301 | Textual Study of Quran III | 3+0 |
| IS-302 | Textual Study of Hadith | 3+0 |
| IS-303 | Contemporary Muslim World & Movements | 3+0 |
| IS-304 | Introduction to world Religions | 3+0 |
| IS-305 | Fiqh al-Quran | 3+0 |
| IS-311 | Ulum-al-Hadith | 3+0 |
| | Total Credit Hours | 18 |

Semester-6

| Course code | Course Title | Credit Hrs |
|-------------|--|------------|
| IS-306 | Research Writing | 3+0 |
| IS-307 | Muslim Family Laws | 3+0 |
| IS-308 | Interfaith Dialogue | 3+0 |
| IS-309 | Textual Study of Al-fiqh-al-akbar | 3+0 |
| IS-310 | Study of Islamic Fiqh(Al-Ibadaat) | 3+0 |
| IS-313 | Comparative study of IHL and Islamic international law | 3+0 |
| | Total Credit Hours | 18 |

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|---|------------|
| IS-401 | Islamic Law of Inheritance | 3+0 |
| IS-410 | Usul-al-Fiqh-al-Islami | 3+0 |
| IS-403 | Economic system of Islam | 3+0 |
| IS-409 | Study of Hadith's Text and Orientalists | 3+0 |
| IS-402 | Quran and Sciences | 3+0 |
| IS-404 | Research Project | 3+0 |
| Total Credit Hours | | 18 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|------------------------------------|------------|
| IS-405 | Islamic Spirituality | 3+0 |
| IS-406 | Gender studies and Human Rights | 3+0 |
| IS-407 | Islam and Modern Political Thought | 3+0 |
| IS-408 | Islamic History of Sub-Continent | 3+0 |
| IS-404 | Research Project | 3+0 |
| Total Credit Hours | | 15 |

Course Contents:**HS-104 English I:**

Basics of Grammar, Parts of speech and use of articles, Sentence structure, active and passive voice, Practice in unified sentence, Analysis of phrase, clause and sentence structure, Transitive and intransitive verbs, Punctuation and spelling, Comprehension, Answers to questions on a given text. Discussion: General topics and every-day conversation (topics for discussion to be at the discretion of the teacher keeping in view the level of students). Listening: To be improved by showing documentaries/films carefully selected by subject teachers. Translation skills: Urdu to English. Paragraph writing: Topics to be chosen at the discretion of the teacher. Presentation skills.

MT-107 Math/Stat-I:**MATHEMATICS I (ALGEBRA)**

Preliminaries: Real-number system, complex numbers, introduction to sets, set operations, functions, types of functions. Matrices: Introduction to matrices, types, matrix inverse, determinants, system of linear equations, Cramer's rule. Quadratic Equations: Solution of quadratic equations, qualitative analysis of roots of a quadratic equations,

equations reducible to quadratic equations, cube roots of unity, relation between roots and coefficients of quadratic equations. Sequences and Series: Arithmetic progression, geometric progression, harmonic progression. Binomial Theorem: Introduction to mathematical induction, binomial theorem with rational and irrational indices. Trigonometry: Fundamentals of trigonometry, trigonometric identities.

Statistics

Definition and importance of Statistics in Agriculture, Data Different types of data and variables. Classification and Tabulation of data, Frequency distribution, stem-and-Leaf diagram, Graphical representation of data Histogram, frequency polygon, frequency curve. Measure of Central tendency, Definition and calculation of Arithmetic mean, Geometric mean, Harmonic mean, Median quantiles and Mode in grouped and un-grouped data. Measure of Dispersion, Definition and Calculation of Range, quartile deviation, Mean deviation, Standard deviation and variance, coefficient of variation.

Practical: Frequency Distribution, Stem-and-Leaf diagram Various types of Graphs, Mean, Geometric mean Harmonic Mean, Median, Quartiles Deviation, mean Deviation.

Standard Deviation, Variance, Coefficient of variation, Skewness and kensis.

IS-101 Tajwid Quran

تجوید قرآن

تجوید کا تعارف، تجوید سیکھنے کے فوائد، ترتیل قرآن، تدویر، حد، تجوید سے قرآن خوانی کی اہمیت اور تجوید میں عام اغلاط، الفاظ کا تلفظ، حروف کی صفات، حروفِ علت، حروف اور الفاظ کو ملانے کا طریقہ اور قواعد تجوید۔ مشق

AR-101 Arabic Language

عربی زبان

روزمرہ عربی، عربی بول چال، ملاقات، تعارف، خاندانی تعلقات، روزہ مرہ زندگی کے معمولات، مختلف افراد اور جگہوں سے متعلق امور کے بارے میں گفتگو۔ صرف اور قواعد صرف، فعل، اسم، ضمیر، اسم اشارہ، اسم موصول، صلات، جملہ: اسمیہ، فعلیہ، خبریہ، انشائیہ، جملوں کی دیگر اقسام، صرف و نحو کے اعتبار سے جملوں کی مشق۔

CS-101 Computing Fundamentals

Basic Definitions & Concepts, Hardware: Computer Systems & Components, Storage Devices, Number Systems. Software: Operating Systems, Programming and Application Software, Introduction to Programming, Databases and Information Systems, Networks Data Communication. The Internet, Browsers and Search Engines The Internet: Email, Collaborative Computing and Social Networking The Internet: E-Commerce, IT Security and other issue.

Non-credit Intermediate English-II:

Paragraph writing: Practice in writing a good, unified and coherent paragraph. Essay writing: Introduction, CV and job application. Translation skills: Urdu to English. Study skill: Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension. Academic skills: Letter/memo writing, minutes of meetings, use of library and internet. Presentation skills: Personality development (emphasis

on content, style and pronunciation) Note: documentaries to be shown for discussion and review.

HS-103 Communication Skills

Paragraph writing. Practice in writing a good, unified and coherent paragraph. Essay writing: Introduction. CV and job application. Translation skills: Urdu to English. Study skills: Skimming and scanning, intensive and extensive, and speed reading, summary and précis writing and comprehension. Academic skills: Letter/memo writing, minutes of meetings, use of library and internet. Presentation skills: Personality development (emphasis on content, style and pronunciation) Note: documentaries to be shown for discussion and review.

IS-102 Quranic Arabic:

قرآنی عربی

جملوں کی اقسام، فعل، فاعل، مفعول، فعل معروف اور مجهول، صلات، جملہ شرطیہ، اسم اور ضمیر، اسم صفت، مذکر اور مؤنث صیغہ، واحد، ثنائیہ اور جمع، مثبت، منفی اور سوالیہ جملے۔ (قرآنی الفاظ، جملوں اور مثالوں کے ذریعے)۔

IS-103 Study of Sirah of Holy Prophet (PBUH)

مطالعہ سیرت النبی ﷺ

قبل از اسلام عرب کے حالات، عالمی حالات، رسول اللہ ﷺ کی ولادت، بچپن، جوانی، قبل از نبوت کے اہم واقعات، نبوت، دعوت و تبلیغ اور اہل مکہ کا رد عمل، ہجرت حبشہ، ہجرت مدینہ، شہری ریاست کا قیام، مؤاخات مدینہ، بیثاق مدینہ، قبائل سے معاہدات، ایک مثالی سماج کا قیام، غزوات، اسباب، واقعات اور نتائج، عالمی رہنماؤں کو اسلام کی دعوت، وصال نبوی۔

AR-102 Arabic Language II (Comprehension)

عربی زبان

تعلیم اللغۃ العربیہ کی کتب سے منتخب پیرا گراف، مختصر کہانیاں، منتخب نثر اور نظم پارے مع گرامر اور عربی لغات۔

IS-105 Introduction to Logic

تعارف منطق

منطق کا مفہوم، تصور اور تصدیق، منطق استقرائی اور استخری، دلالات کی اقسام، قضایا، قیاسیات، منطق کی افادیت۔

Non credit Intermediate Pak Study

مطالعہ پاکستان (انٹرمیڈیٹ) صرف خاصہ کے لیے

پاکستان کی نظریاتی اساس، سرسید احمد خان، علامہ اقبال اور قائد اعظم محمد علی جناح کی افکار کی روشنی میں، دو قومی نظریہ، برصغیر میں اسلامی تہذیب، آبادی اور علاقائی تقسیم، محل وقوع اور جغرافیائی حدود، پاکستان میں حکومت اور سیاست کے مختلف ادوار۔
سیاسی اور آئینی مراحل:

1947-1958-1971-1977-1988-اب تک

پاکستان کے موجودہ حالات: معاشی ادارے اور مسائل، سماج اور سماجی تقسیم، قومیتیں، خارجہ پالیسی اور چینلجیز، مستقبل کے امکانات۔



IS-411 Professional Ethics

Important ethical teachings, purification of inner self from arrogance, jealousy and selfishness, change of undesirable habit and elimination of social evil, sincerity, hard work, concept of Halal and Haram regarding professions and professional activities, vast concept of trust and its application in the professions, honesty and truth, piracy, hacking, cybercrime, consumer crime and concealment of knowledge, fulfilment of commitments, respect of human beings in general and clients in particular, ethical obligation of a worker and an organization, advertising ethics, current ethical issues in Pakistan, role of prayer (Dua), self control and struggle to face the challenges (Sabr) and gratitude or use the opportunities (Shukr) to make the life a success, time management and punctuality.

AR-201 Arabic Literature

عربی زبان و ادب

عربی ادب کی کتب سے منتخب پیرا گراف، مختصر کہانیاں، منتخب نثر اور نظم پارے مع گرامر اور عربی لغات۔

IS-201 Textual Study of Holy Quran-I

مطالعہ متن قرآن-1

سورة الاحزاب

غزوہ احزاب کا پس منظر، سارے عرب کا مسلمانوں کے خلاف اجتماع، خندق کی کھدائی، مسلمانوں اور منافقوں کے کردار کا موازنہ، بنو قریظہ کی معاہدے کی خلاف ورزی اور ان کا انجام، ازواج مطہرات کے لیے خاص احکام، نبی اکرم ﷺ بطور خاتم النبیین، رسول اللہ کی عائلی زندگی کے حوالے سے مسلمانوں کے لیے احکام۔ متن آیات مع عربی لغات، گرامر، تفسیر و تاویل۔

IS-202 Islamic History (تاریخ اسلام (خلافت راشدہ)

خلافت راشدہ۔ حضرت ابوبکر صدیق، خلافت کا آغاز، جھوٹے مدعیان نبوت، مانعین زکوٰۃ اور مرتدین کے خلاف کارروائی، عہد صدیقی کے کارہائے نمایاں، حضرت عمر فاروق کی جانشینی، فتوحات، داخلی نظم و نسق، امن عامہ، کفالت عامہ، عدالتی نظام، شوری، حضرت عثمان کی خلافت، فتوحات، کارہائے نمایاں، فتنہ کے اسباب اور نتائج، حضرت علی کی خلافت، جنگ جمل اور جنگ صفین، واقعات و نتائج حضرت علی کی سیرت و کردار۔

IS-203 Ulum-al-Quran علوم قرآن

جمع و تدوین قرآن، سبکی اور مدنی سورتوں کی خصوصیات، محکمات و متشابہات، نسخ فی القرآن، تدریجی نزول، اسباب نزول، مضامین قرآن، تفسیر قرآن کے ماخذ و مصادر، مناسخ تفسیر اور تفسیری ادبیات کا ارتقا۔

IS-208 Introduction to the selected topics of the Holy Quran مضامین قرآن کا تعارف

قرآنی موضوعات کا تعارف، عقائد، (توحید، رسالت، آخرت) کے متعلق آیات اور عقائد کے انسانی زندگی پر اثرات، عبادات (نماز، روزہ، زکوٰۃ، اور حج سے متعلق آیات) کی روشنی میں عبادات کی اہمیت، سیاست، معاشرت اور معیشت کے متعلق اہم قرآنی آیات اور تعلیمات، تخلیق کائنات کا قرآنی مفہوم، قرآنی آیات اور تخلیق کائنات کے مدارج، قرآن پاک کا اسلوب تاریخ اور تاریخی واقعات و شواہد کی اہمیت بنی اسرائیل، یہود و نصاریٰ مشرکین اور منافقین کے عقائد اور سماجی رویے قرآنی آیات کی روشنی میں۔

IS-204 History and Compilation of Hadith تاریخ تدوین حدیث

جمع و تدوین حدیث کے مختلف ذرائع، عہد نبوی میں، عہد صحابہ کرام میں، سرکاری دستاویزات، ذاتی مجموعے، عہد صحابہ کی دستاویزات، سلسلہ سند کا آغاز و ارتقا، وضع حدیث کا فتنہ اور علم جرح و تعدیل کا

آغاز، حجیت سنت: قرآن کی رو سے، نبی اکرم ﷺ کے چہارگانہ فرائض، عہد تدوین اور سنی مکاتب فکر کی مستند ترین کتب حدیث کا تعارف، صحاح ستہ اور شیعہ مکتب فکر کی کتب اربعہ کا تعارف۔

IS-205 Textual Study of Holy Quran-II

مطالعہ متن قرآن

سورۃ النور

بدکاری اور قذف کی سزا، واقعہ اٹک اور اس کی تفصیلات، حجاب اور سماجی تعلقات کا دائرہ کار، کائنات اور آیات الوہیبیت، منافقین کی ریشہ دوانیاں، خلافت ارضی کا وعدہ۔ متن آیات مع عربی لغات، گرامر، تفسیر و تاویل کے حوالے سے۔

HS-402 Economics

For contents, please refer to page number 28.

IS-206 History of Islamic Law تاریخ فقہ اسلامی

فقہ کا لغوی و اصطلاحی مفہوم، فقہ سے متعلق بنیادی اصطلاحات، فقہ اسلامی کا اساسی دور، عہد نبوی میں فقہ، خلافت راشدہ میں فقہ اور اس کی خصوصیات، فقہ اسلامی کا ارتقا، حنفی، شافعی، مالکی، حنبلی اور جمہوری مکاتب فقہ کا ظہور اور ان کے بانیاں اور معروف فقہاء کا تعارف۔ فقہی کتب کا تعارف، غیر مروجہ مکاتب فکر، دور تقلید، پاکستان میں اسلامی قانون سازی کی تاریخ۔

IS-208 Al-Da'wah-wal-Irshad دعوت و ارشاد

دعوت کا تعارف، دعوت کی اہمیت، داعی کے اوصاف، دعوت کے اصول، انبیاء کرام کی دعوت کے اسباب، رسول اللہ ﷺ کی زندگی سے دعوت کے وسائل، دعوت اسلامی کے چیلنجز۔ جدید دنیا میں دعوت دین کا طریق کار اور داعیوں کی تربیت کا طریقہ۔

IS-209 History of Tafsir

تاریخ تفسیر

علم تفسیر کا تعارف، علم تفسیر کی اہمیت، تفسیر کی اقسام، تفسیر بالماثور اور تفسیر بالرأے۔ تفسیر بالماثور کی نمائندہ کتب، تفسیر بالرأے کی نمائندہ کتب، علم تفسیر کا ارتقا، تفسیری رجحانات (فقہی اسلوب، سائنسی

زرتشت ازم، سکھ مذہب، جین مذہب۔ سمائی مذاہب: یہودیت، مسیحیت اور اسلام۔ مذکورہ مذاہب کے عقائد، تعلیمات، عبادات، مقدسات اور تہذیب اور روایات کا تقابلی مطالعہ۔

IS-305 Fiqh al-Quran

فقہ القرآن

فقہ القرآن کا تعارف، قرآنی احکام: طہارت، نماز، روزہ، زکوٰۃ، حج، عائلی قوانین، میاں بیوی کے حقوق و فرائض، اولاد کے حقوق، یتیمی اور یتیموں کے حقوق، قانون شہادت، قانون حلال و حرام، معاہدات، سماجی ذمہ داریاں، تجارت و سود، قانون جنابیت، ریاست اور شہریوں کے حقوق اور بین الاقوامی تعلقات۔

IS-311 Ulum-al-Hadith

علوم الحدیث

علوم الحدیث کا تعارف، حدیث کی اقسام، اصول حدیث، روایت حدیث کے اصول و ضوابط، سند کے اعتبار سے حدیث کی اقسام، متن کے اعتبار سے حدیث کی اقسام، صحت کے اعتبار سے حدیث کی اقسام، روایت حدیث کے اصول، نقل حدیث کے طرق، طبقات رواۃ حدیث، علوم الحدیث کی انواع، علم جرح و تعدیل، علم مختلف الحدیث، علم اسماء الرجال، علم حدیث، غریب الحدیث، ناخ و منسوخ، کتب حدیث کی اقسام، علم حدیث کے دوسرے علوم پر اثرات۔

IS-306 Research Writing

تحقیق نگاری

اسلام میں تحقیق کے اصول و مبادی: روایت و درایت اور ان کی تطبیق، تفسیر، حدیث، فقہ، اصول فقہ، تاریخ اور دیگر اسلامی علوم میں ریسرچ کا طریقہ کار: لائبریری ریسرچ، سرورے، لیبارٹری ریسرچ، موضوع کا انتخاب، خاکہ کی تیاری، مواد جمع کرنے کا طریقہ، مواد کی جانچ پڑتال، علمی تحقیق نگاری، نیر تحقیق کے سوال، مشاہدہ اور تجربہ سے لیکر مقالہ کے دفاع تک کی تربیت

IS-307 Muslim Family Laws

مسلم عائلی قوانین

شادی: منگنی اور اس کا مقصد، نکاح کا معاہدہ اور اس کی شرائط، مہر اور جہیز، طلاق اور اس کی قسمیں، طلاق کا شرعی طریقہ، عدت، نابالغ بچوں کا نان و نفقہ، قرآن کا قانون میراث، یتیمی کی وراثت، یتیم

اسلوب، فلسفیانہ اسلوب، ادبی و بلاغی، اسلوب اشاری اسلوب، دعوتی تفسیر، اجتماعی تفسیر، کلامی تفسیر، الحادی و باطنی تفسیر، موضوعی تفسیر (فرائضی کتب فکر، برصغیر میں حنفی کتب فکر کے نامور مفسرین، سید مودودی، پیر کرم شاہ ازہری اور علامہ غلام رسول سعیدی کی خدمات۔

IS-301 Textual Study of Quran III

مطالعہ متن قرآن-3

سورۃ آل عمران، 1 تا 101۔ موضوعات سورۃ آل عمران: صفات باری، موازنہ حیات دنیوی و اخروی، دین اسلام کی آفاقیت، وفد بنو نجران کے ساتھ مکالمہ کے نکات، ولادت مریم و مسیح، معجزات مسیح، یہود کا کردار، بیت اللہ کی اولیت، متن آیات مع عربی لغات، گرامر، تفسیر و تاویل کے حوالے سے۔

IS-302 Textual Study of Hadith

مطالعہ متن حدیث

موطا امام مالک، کتاب الصوم و کتاب الزکوٰۃ۔ کتاب الصوم: رویت ہلال، فرض اور نفل روزے، مریض اور مسافر کے لیے روزے کا حکم، رمضان کے روزوں کی قضا، فدیہ اور کفارہ، یوم شک کا روزہ۔ کتاب الزکوٰۃ: نصاب زکوٰۃ، مستحقین زکوٰۃ، اموال کی اقسام اور ہر ایک کا نصاب زکوٰۃ، مشترک مال کی زکوٰۃ، زکوٰۃ و عشر سے مستثنیٰ اشیاء، جزیرہ اور ٹیکس، صدقہ فطر۔ مؤطا امام مالک کے متن کی روشنی میں۔

IS-303 Contemporary Muslim World & Movements

جدید دنیائے اسلام اور تحریکات

مسلم ریاستوں کا جغرافیائی محل وقوع، مختصر تاریخ، سماجی اور تمدنی روایات، وسائل اور مسائل، اسلامی ممالک میں ہم آہنگی کی کوشش، مختلف ممالک کی مذہبی اور سیکولر تحریکیں، اسلامی ممالک میں پاکستان کا کردار، اس کی اہمیت، پاکستان کی خارجہ پالیسی اور علاقائی تنظیموں میں پاکستان کا کردار۔

IS-304 Introduction to world Religions

مذاہب عالم کا تعارفی مطالعہ

مذہب کی ضرورت و اہمیت، مذہب کا آغاز، سماجی و غیر سماجی مذاہب۔ ہندو دھرم: بدھ مت،

پوتے کی وراثت اور مسلم فیملی لازماً تنقیدی مطالعہ۔

IS-310 Study of Islamic Fiqh (Al-Ibadaat)

مطالعہ فقہ (عبادات)

مختصر القدوری کی کتاب الطہارت اور کتاب الصلاۃ کا مطالعہ

مسائل طہارت: طہارت کی اقسام، نواقض طہارت، اوقات صلاۃ، اذان، نمازوں کی اقسام، فرائض و واجبات اور نوافل، شرائط صلاۃ، ارکان صلاۃ، مفسدات صلاۃ، نمازوں کی اقسام: نماز استنشاء، نماز کسوف و خسوف، نماز جنازہ۔

IS-313 Comparative study of IHL and Islamic international law

بین الاقوامی انسانی قانون اور اسلامی قانون سیر کا تقابلی مطالعہ

اسلامی اور انسانی قوانین کا تقابلی مطالعہ، انسانی تحفظ کے بنیادی تصورات بین الاقوامی انسانی قانون IHL کا ارتقائی جائزہ، عالمی جنگی قوانین اور اسلامی قوانین حرب کا موازنہ جنگی جرائم اور ان کا سدباب، دہشت گردی کا جدید تصور اور اس کا سدباب، جنگ سے متاثرہ افراد کی حفاظت اور بحالی۔ امن کا اسلامی قانون۔ سفارت کاری، معاہدات اور بعد از جنگ کی صورت حال سے متعلقہ قوانین۔

IS-308 Interfaith Dialogue

مکالمہ بین المذاہب

مکالمہ بین المذاہب کی ضرورت و اہمیت، مذاہب کے درمیان اختلافات اور مکالمہ کی تاریخ، مختلف مذاہب میں مشترکات و اختلافات، مکالمہ کے اصول و ضوابط، مکالمہ بین المذاہب کی قرآنی اساسیات اور مختلف مذاہب پر اس کا اطلاق، اسلام اور سماجی مذاہب کے درمیان مکالمہ، اسلام اور غیر سماجی مذاہب کے درمیان مکالمہ۔

IS-309 Textual Study of Al-fiqh-al-akbar

مطالعہ فقہ اکبر

فقہ اکبر کا مفہوم، قرآنی عقائد، فقہ اکبر کا آغاز و ارتقاء، فقہ اکبر پر فرقہ وارانہ اثرات، توحید خداوندی، توحید ذات و صفات، نبوت، معجزات، آخرت، قضاء و قدر، اشعرہ، ماتریدہ اور معتزلہ کے عقائد کا تقابلی مطالعہ، الحاد اور اس کے اسباب و علاج۔



IS-401 Islamic Law of Inheritance

اسلام کا قانون وراثت

اسلام میں میراث کا تصور اور اس کا دائرہ کار، قرآنی وراثہ اور ان کے حصص، عصبات، ذوی الفروض، ذوی الارحام، موانع ارث، عول، رد، وصیت اور اس کے اقسام، یتیم پوتوں اور نواسوں کی وراثت۔

IS-402 Quran and Science

قرآن اور سائنس

تعارف، قرآن اور سائنس کا باہمی تعلق، تخلیق کائنات، قرآن اور سائنس کے بیانات کا موازنہ، فلکیات: قرآن اور سائنس کا موازنہ، پانی، بارش اور ہوائیں، سمندر، پہاڑ، زمین اور فضا قرآن اور سائنس کے حوالے سے، تخلیق حیات اور تخلیق آدم، انسانی افکار، اعمال اور اقوال کی ریکارڈنگ، سائنس اور قرآن کی روشنی میں امکان قیامت۔

IS-403 Economic system of Islam

اسلام کا اقتصادی نظام

اسلام کا فلسفہ تقسیم دولت، اسلام کا تصور حلال و حرام، اسلام کا تصور وراثت و وصیت، اسلام کا فلسفہ کفالت، اسلام کا فلسفہ نفقات خاصہ، صنعت و تجارت، زراعت اور مزارعت کے اسلامی اصول، اسلام کا تصور شراکت، اسلام کا تصور مضاربت، اسلام کا تصور قراض۔

IS-409 Study of Hadith's Text and Orientalists

درایت حدیث؛ مستشرقین کے اعتراضات کا جائزہ

متن حدیث کا تعارف، متن حدیث جانچنے کے اصول، حفاظت قرآنی سے متعلق روایات، ظاہری تعارض پر مبنی روایات، قرآن حکیم سے متعارض روایات، سیاست و قضا سے متعلق روایات، انبیاء کرام کی سیرت سے متعلق روایات، رسول ﷺ کی نجی زندگی سے متعلق روایات، عقل عام اور مشاہدہ سے ظاہری معارض روایات، ماضی اور مستقبل کی خبروں پر مشتمل روایات۔

IS-410 Usul-al-Fiqh-al-Islami

اصول فقہ اسلامی

فقہ اسلامی کے اصول کتاب اللہ اور سنت نبوی میں، عہد نبوی اور خلافت راشدہ میں اجتہاد اور اس کے اساسیات، فقہ حنفی کے اصول و کلیات، امام شافعی کی کتاب الرسالہ، ابتدائی صدیوں کے مجتہدین کے فقہی اصول کا موازنہ، اصول فقہ میں کتاب، سنت، اجماع، قیاس اور دیگر مستدلالات کا تعارف اور تطبیق، تقلید اور اس کے اثرات، دور جدید میں ضرورت اجتہاد اور اس کا دائرہ کار۔

IS- 404 Research Project

IS-405 Islamic Spirituality

اسلامی تصوف و اخلاق

باطنی پاکیزگی کا تصور، احسان و تزکیہ کا مفہوم، اسلامی اخلاق کی اساسیات، اسلامی اخلاق کے مقاصد، فضائل اخلاق کا محرک، رذائل اخلاق سے پاکی کے طریقے، حسن نیت، اخلاص، تقویٰ، رضا، الہی، خالق اور اس کی مخلوق سے محبت اور صبر و شکر۔

IS-406 Gender studies and Human Rights

مطالعہ جنسی امتیاز اور حقوق انسانی

اسلام میں خواتین کا مقام، قرآن و سنت میں عورت کی حیثیت، خواتین کے حقوق، میاں بیوی کے حقوق میں توازن، نفقہ، رہائش اور ضروریات زندگی، مہر، طلاق کا حق اور خلع، خواتین کی سماجی، معاشی



اور سیاسی سرگرمیاں، اسلام کی روشنی میں بنیادی انسانی حقوق، اسلام اور اقوام متحدہ کے چارٹر کا موازنہ، اسلامی ریاست میں غیر مسلم شہریوں کے حقوق، غیر اسلامی ریاستوں میں مسلمانوں کے فرائض۔

IS-407 Islam and Modern Political Thought

اسلام اور جدید سیاسی افکار

اسلام میں ریاست کی ضرورت و اہمیت، اسلامی ریاست کے مقاصد، حاکمیت الہی، رسول اکرم بحیثیت شارع، شہریوں کے حقوق و فرائض، قانون سازی کا طریقہ کار، شوریٰ کی اہمیت، اقلیتوں کے حقوق، اولوالامر کے اوصاف، قانونی اور اجتماعی عدل، کفالت عامہ۔

S-408 Islamic History of Sub-Continent

برصغیر پاک و ہند کی اسلامی تاریخ

برصغیر کا تاریخی و جغرافیائی پس منظر، برصغیر کا تمدن، مذاہب، ہندوستان میں مسلمانوں کی آمد اور عرب و ہند کے تعلقات، غزنوی، غوری اور مغل بادشاہتیں، برصغیر کے نامور مسلم صوفیا اور ساج پران کے اثرات، برصغیر کے نامور مسلم سرکارز اور ان کی خدمات، مسلمانوں کی تہذیب کے زوال کے اسباب اور نشاۃ ثانیہ کا لائحہ عمل۔

Courses Offered to Other Departments

| Course Code | Course Title | Credit Hours |
|-------------|------------------------------|--------------|
| IS-211 | Islamic Studies | 2 |
| HS-401 | Professional Values & Ethics | 2 |
| HS-102 | Pakistan Studies | 2 |
| HS-302 | International Relations | 3 |

IS-211: Islamic Studies

انسان اور دوسری مخلوقات میں بنیادی فرق، زندگی کے بنیادی سوالات، زندگی ایک آزمائش، آزمائش میں کامیابی کا حصول، کامیابی کے حصول کا ذریعہ: ہدایت، ہدایت کے ذرائع: علم اور ذرائع علم، وجدان، ہدایت، فطرت، حواس، عقل، الہامی ہدایت، الہامی ہدایت: قرآن، خصوصیات: آخری، مکمل، اور محفوظ کتاب، فہم قرآن کی اہمیت، قرآنی معاشرے کا قیام، الہامی ہدایت: سنت، قرآن کی عملی تفسیر، اطاعت رسول کی ضرورت و اہمیت، اطاعت رسول کا دائرہ کار، حقیقت توحید و شرک، توحید ذات و صفات، توحید کے تقاضے، توحید کے اثرات، شرک اور اس کی اقسام۔ مکالمہ بین المذاہب، مختلف مذاہب کی متفقہ اساسیات، وحدت نسل انسانی، شرف انسانیت، مساوات نسل انسانیت، مختلف مذاہب کے پیروکاروں کے باہمی تعلقات، ریاستوں کے باہمی تعلقات، اقوام متحدہ کے چارٹر کی روشنی میں، قرآن حکیم کی تعلیمات، حدیث نبوی اور معابدات نبوی، فقہ اسلامی کی روشنی میں، مسلم اور غیر مسلم تعلقات کا دائرہ کار، بنیادی حقوق، معاشرتی حقوق، تجارتی حقوق، رواداری حدود و تعلقات، مسلمان غیر اسلامی ریاستوں کے شہری، بطور شہری حقوق و فرائض، عدالتی اختیارات اور مذہبی امور، سیاسی امور میں شرکت کا دائرہ کار، محرمات اور بطور مسلمان رویہ کی حدود، فرقہ، ہم آہنگی اور اسلامی تعلیمات، فرقہ بندی کی اساس، اسلام میں فرقہ بندی کی ممانعت، اختلافات باعث رحمت اور فکری ارتقاء، اختلاف کو خلاف بنانے کے مفاسد، اسلامی فرقوں میں اہم آہنگی کیسے پیدا کی جائے، اسلام کا تصور عبادت: ہمہ وقتی عبادت، اہم عبادات، نماز کی اہمیت اور اثرات، دین میں ترجیحات، فرائض، واجبات، سنن اور مستحبات، انفرادی اور اجتماعی حقوق، حقوق و



فرائض میں توازن، اہم ذمہ داریوں کی اولین اہمیت، صداقت و امانت، دل، دماغ اور زبان کی سچائی، زبان کو آلودگی سے محفوظ رکھنا، امانت کی اہمیت اور امانت کے مفہوم کی وسعت، صدق و امانت کے ثمرات، عدل، اہمیت، عدل کی معاشرتی اور قانونی بنیادیں، عدل اجتماعی یا کفالت عامہ، طبقاتی عدل، کسب حلال اور محنت کی عظمت، ذمہ داری اور عہد کی اہمیت، حلال و حرام کے اسلامی معیار، حلال و حرام کے اثرات، رذائل اخلاق اور ان کے اثرات، تکبر، حسد، غصہ، لالچ، انسانی شخصیت پر ان کے اثرات۔

عملی کام:

نماز کی تصحیح، ترجمہ اور ضروری مسائل۔ قرآن کیا خرمی دس سورتوں کا یاد کرنا۔ قرآن کی منتخب آیات کا ترجمہ و مفہوم (سورۃ المؤمنون ابتدائی 11 آیات، سورۃ الفرقان 61 تا 77، سورۃ الحجرات 10 تا 18)۔

HS-102 Pakistan Studies

Ideology of Pakistan and Two Nation Theory, Nation state and nationalism, Sir Syed Ahmad Khan (Aligarh Movement), Allama Iqbal and Quaid-e-Azam on Two Nation Theory, Role of minorities in Pakistan Movement, Role of Women in Pakistan Movement, Overview of Muslim politics in United India from 1906 to 1947, Pakistan Constitution of 1956, 1962 and 1973 (with amendments), Political History of Pakistan (1970-2013), Major issues of conflict between Pakistan and India, Pakistan's foreign policy, Pakistan's relation with international community, OIC, ASEAN, SAARC, SCO and ECO, Physiographic Features of Pakistan, Geo-strategic importance of Pakistan, Various political, social, economic and cultural issues like National integration/ sovereignty violation, quagmire of front line state, menace of corruption, energy crisis, Importance of Gawadar Port and CPEC.

HS-401 Professional Values & Ethics

Introduction and meaning of ethics and professional ethics; historical background of professional ethics and its need in engineering practice; essentials of professional ethics; ethical issues in engineering practice; resolving ethical

problems; engineers and environment; societal concerns in engineering practice; plagiarism; Pakistan Engineering Council's Code of Ethics; and case studies.

HS-302 International Relations

Understanding International Relations: Introduction, History, Meaning, Nature and Importance, Theories of International Relations: Realism/ Neo-Realism, Liberalism/ Neo-Liberalism, Marxism, Feminism, National Interests and its elements, Nationalism, Sovereignty, Diplomacy, National Power, Power Politics/ Hans Morgenthau's fourteen points, International Organizations, International Political Economy: The North-South Gap, International Development, International Law & Law of Armed Conflict, Collective Security, Human rights in International Relations, Globalization, Global Issues and International Relations, Clash of Civilizations, Foreign Policies of Selected countries, International Issues: Nuclear Proliferation, Humanitarian Intervention and World Politics, Poverty, Development and Hunger, Gender Issues, Environment protection.

Journal of Islamic Studies:

The Department of Islamic Studies is launching a research Journal of Islamic Studies; "HITEC ISLAMICUS" on bi-annual basis. It is a Trilingual (Urdu, Arabic and English) peer reviewed research Journal, a forum for the scholars to analyze the current problems and futuristic issues in the light of classical sources of Islam, which will keep the readers up to date about modern juristic and social issues. In addition to that the Journal will publish research articles related to the renaissance of Islamic thought, philosophy and scientific knowledge. Thus, the Journal welcomes original contributions of researchers in all branches of Islamic Studies.

MS Islamic Studies

The Department offers MS in Islamic Studies; it is a broad based program, focusing on contemporary socio-political and economic issues, Ijtihad, objectives of Islamic Shariah, Islamic philosophy, International relations, Islamic world view and contemporary study of major world religions. Researchers are encouraged to work on practical issues to fulfil the needs of our society in particular and humanity in large. The MS degree is awarded after completion of 30 credit hours, 24 of which are course work. The remaining 6 credit hours can be completed either by writing a research thesis or by taking 2 additional courses from the list of offered subjects in respective semester.



PhD Islamic Studies

The Doctor of Philosophy (Ph.D.) in Islamic Studies is the highest degree awarded by the Department. The program comprises 18 credit hours of course work and 30 credit hours of research thesis. The courses are selected in consultation with the thesis supervisor. The progress of student is continuously monitored through the Guidance and Evaluation Committee (GEC).

The students eligible for admittance in Ph.D. program should possess MS/M.Phil. Degree with a minimum CGPA 3 out of 4 and should have passed GAT subject examination as per requirement of HEC, in vogue.

The completion of course work is followed by comprehensive examination for granting candidacy as a Ph.D. Scholar. The program necessitates two years of residency in HITEC University.

The Ph.D. thesis is evaluated by one local and two foreign experts from technologically more advanced countries, as per requirement of the HEC. After positive evaluation from these experts, the Ph.D. Scholar is required to undergo through an open defense to fulfill the degree requirements.

The degree is awarded in recognition of high level of scholarship, the ability to carry out independent research, and the publication of such research in national and international journals of repute.

The Department encourages the researchers to work on current problems and futuristic issues related to the renaissance of Islamic thought, philosophy and scientific knowledge, leading to the ultimate truth.

LIST OF MS/PHD COURSES

| Course Code | Course Title | Credit Hours |
|-------------|---|--------------|
| IS-801 | Development of Quranic Commentary Literature and its Trends | 3+0 |
| IS-802 | Diligence in Islam (Ijtihad) | 3+0 |
| IS-803 | Objectives of Islamic Shariah (Maqasid al-Shariah) | 3+0 |
| IS-804 | Islamic Thoughts and Sciences: Source Literature | 3+0 |
| IS-805 | Islamic Philosophy | 3+0 |
| IS-806 | Contemporary Issues: Islamic View Point | 3+0 |
| IS-807 | Hadith Studies | 3+0 |
| IS-808 | Principles of Tafsir | 3+0 |
| IS-809 | Principles of Hadith | 3+0 |
| IS-810 | Comparative Study of Tafsir Literature | 3+0 |
| IS-811 | Principles of Fiqh | 3+0 |

| | | |
|--------|--|-----|
| IS-812 | Comparative Study of Different Juristic Schools of Thought | 3+0 |
| IS-813 | Islamic Banking and Finance | 3+0 |
| IS-814 | Management & Administration in Islam | 3+0 |
| IS-815 | Islamic World View | 3+0 |
| IS-816 | International Relations and Islam | 3+0 |
| IS-817 | Comparative Study of Major World Religions | 3+0 |
| IS-818 | Islam and Science | 3+0 |
| IS-819 | Research Methodology | 3+0 |
| IS-820 | Analytical Study of Seerah | 3+0 |
| IS-821 | Ethics of Disagreement in Islam (Adab al-Ikhtalaf) | 3+0 |
| IS-822 | Dawah Principles & Techniques | 3+0 |
| IS-823 | Islamic Economics | 3+0 |
| IS-824 | Islamic Political System | 3+0 |
| IS-886 | MS Thesis/Two Courses | 6+0 |



Department of English

A language equips us with a system of communication leading to the expression of thought by means of speech. It is this faculty that has led the human species to have dominated the planet as the fittest. Language and communication enabled man to encode whatever was conceived with the five senses and with intuition for sharing with the fellow beings. That was how knowledge and wisdom developed and spread, leading to the establishment of societies and its various institutions, thought patterns, laws, civic sense, cultures, traditions, folkways, natural phenomena were understood and laws of nature were translated into meaningfulness. Thesis, anti-thesis and synthesis of knowledge led to the creation of its various fields and implementation, putting the world onto the path of progress.

English, being an international language holds a special place amongst all other languages. It is the medium of instruction and language occupying the official status in organizations. Its various modules are instructed to students of various disciplines to help them fare better both in their academic and professional careers.

The management, understanding the importance of English language and in furtherance of its diversification policy by creating new departments, established the department of English at HITEC University. It was felt that the need of a considerable market in the form of students in the adjacent and surrounding areas could be fulfilled by offering BS English. The department offers admissions in BS English from Fall Semester 2020. It is a four years program, comprising eight semesters. The program offers a fine blend of Linguistics and Literature in English to orient learners to the core linguistic and literary concepts and their various applications.

The department has a team of experienced and dedicated faculty members, who impart quality education. The well-furnished and air-conditioned classrooms with conducive learning environment, a very well stocked central library, IT infrastructure, common rooms, cafeteria, mosque, indoor and outdoor games and sport facilities, all in a safe, secure, walled and guarded environment make studying at HITEC University a befitting and fulfilling experience.

BS English Curriculum

Semester-1

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------|------------|
| HS- 101 | English | 3 |
| HS-102 | Pakistan Studies | 2 |
| MT-107 | Maths | 3 |
| EC-110 | Computing Fundamentals | 3 |
| ENG-101 | Research and Report Writing | 3 |
| ENG-102 | History of English Language | 3 |
| Total Credit Hours | | 17 |

Semester-2

| Course code | Course Title | Credit Hrs |
|---------------------------|---|------------|
| IS-211 | Islamic Studies | 2 |
| HS-103 | Communication Skills | 3 |
| ENG-103 | History of English Literature | 3 |
| ENG-104 | Introduction to English Language and Literature | 3 |
| ENG-105 | Psycholinguistics | 3 |
| ENG-106 | Short Fiction | 3 |
| Total Credit Hours | | 17 |

Semester-3

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------------------|------------|
| ENG-201 | Literary Theory and Criticism | 3 |
| ENG-202 | Classical and Elizabethan Drama | 3 |
| ENG-203 | Classical Poetry | 3 |
| ENG-204 | Introduction to Phonetics & Phonology | 3 |
| ENG-205 | Sociolinguistics | 3 |
| ENG-206 | Pragmatics | 3 |
| Total Credit Hours | | 18 |

Semester-4

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------------|------------|
| HS-403 | Management and Entrepreneurship | 3 |
| ENG-207 | Novel | 3 |
| ENG-208 | Post-Colonial Literature | 3 |
| ENG-209 | Prose | 3 |
| ENG-210 | Stylistics | 3 |
| ENG-211 | Morphology and Syntax | 3 |
| ENG-212 | Romantic and Victorian Poetry | 3 |
| Total Credit Hours | | 21 |

Semester-5

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------------|------------|
| HS-302 | International Relations | 3 |
| ENG-301 | Literary Theory and Practice | 3 |
| ENG-302 | Modern Drama | 3 |
| ENG-303 | Modern Poetry | 3 |
| ENG-304 | Pakistani Literature in English | 3 |
| ENG-3XX | Elective Course | 3 |
| Total Credit Hours | | 18 |

Semester-6

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------------|------------|
| ENG-305 | Modern Novel | 3 |
| ENG-306 | Literature of War and Conflict | 3 |
| ENG-307 | TEFL | 3 |
| ENG-308 | World Englishes | 2 |
| ENG-309 | American Literature | 3 |
| ENG-3XX | Elective Course | 3 |
| Total Credit Hours | | 17 |

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|----------------------------------|------------|
| ENG-401 | Introduction to Women's Writings | 3 |
| ENG-402 | Twenty First Century Literature | 3 |
| ENG-403 | Language, Gender, and Culture | 3 |
| ENG-404 | Applied Linguistics | 3 |
| HS-404 | Foreign Language | 2 |
| Total Credit Hours | | 14 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------------|------------|
| ENG-405 | Creative Writing | 3 |
| ENG-406 | Research Project | 3 |
| ENG-4XX | Elective Course | 3 |
| ENG-4XX | Elective Course | 3 |
| | Workshop on Research Mechanics | |
| Total Credit Hours | | 12 |

List of Electives (Literature)

| Course code | Course Title | Credit Hrs |
|-------------|------------------------|------------|
| ENG-310 | Shakespearean Plays | 3 |
| ENG-311 | World Literature | 3 |
| ENG-409 | African Literature | 3 |
| ENG-410 | South Asian Literature | 3 |

List of Electives (Linguistics)

| Course code | Course Title | Credit Hrs |
|-------------|-----------------------------|------------|
| ENG-312 | Critical Discourse Analysis | 3 |
| ENG-411 | Computational Linguistics | 3 |
| ENG-412 | Semantics | 3 |

Course Contents

ENG-101 Research and Report Writing

Introduction: Qualitative and Quantitative Research Paradigms, Identifying and Defining a Research Problem, Ethical considerations, Sampling Techniques, Tools for Data Collection: Questionnaires, Interviews, Observations, Documents, etc. Data analysis and Interpretation, Some Aspects of the Research Report Review of literature, Transcription and Transliteration, Referencing and Citation

ENG-102 History of English Language

Course Introduction, Language change, The Germanic languages, Indo-European, Proto-Indo-European to Proto-Germanic, Pre-Old English, Old English, Middle English, Early Modern English, Word formation, Late Modern English, Varieties of English, American and British English, Linguistic change in process, English today and tomorrow

HS-102 Pakistan Studies

For contents, please refer to page number 173.

ENG-103 History of English Literature

The Anglo-Saxon Literature, The Development of Middle English Prose and Verse, Middle English Literature, Chaucer, Gower, Plowman, The End of the Middle Ages, The Early Tudor Scene, Spenser and his Time, Drama from the Miracle Plays to Marlowe, Shakespeare, Drama from Jonson to the Closing of the Theatres, Poetry after Spenser: The Jonsonian and the Metaphysical Traditions, Prose in the Sixteenth and Seventeenth Centuries, Milton: Scottish Literature to 1700, The Restoration, The Augustan Age: Defoe, Swift, Pope, Poetry from Thomson to Crabbe, The Novel from Richardson to Jane Austen, Eighteenth Century Philosophical, Historical, and Critical Prose, and Miscellaneous Writing, Scottish Literature

from Allan Ramsay to Walter Scott, The Romantic Poets I: Blake, Wordsworth, and Coleridge, The Romantic Poets II: Shelley, Keats, and Byron, Familiar, Critical, and Miscellaneous Prose of the Early and Middle Nineteenth Century, Victorian Prose: John Henry Newman to William Morris, The Victorian Poets, The Victorian Novel, Drama from the Beginning of the Eighteenth Century, Twentieth Century Poetry, The Twentieth Century Novel, Postmodern Literature, The Recent Times, with an Exclusive Focus on Literary Movements: Postmodernism, Realism, Naturalism, Modernism, Symbolism, Existentialism, Surrealism

ENG-104 Introduction to English Language and Literature

General introduction to language and literature, Mr Know-All by W. Somerset Maugham, Arrival of the Monsoon by Taufiq Rafat, A Street Revisited by Daud Kamal, Rose by Guy De Maupassant, The Little Prince by Antoine De Saint-Exupery, Ode on Gracian Urn by John Keats, My Last Duchess by Robert Browning, Cocksure Women and Hensure Men by D H Lawrence, Hands Across the Sea by Noel Coward, Cat in the Rain by Ernest Hemmingway, Pygmalion by Bernard Shaw, The Bull and the She Devil by Zaib-un-Nisa Hamidullah, The Alchemist by Paulo Coelho, The Origins of Language, The Properties of Language, Discourse Analysis, Language, Society, and Culture

ENG-105 Psycholinguistics

The Great Automatic Grammatizator: Need Anything be Innate? Is Language Restricted to Humans? Is there Biological Evidence for Innate Language Capacity? Is there a Pre-Ordained Language Program? What Grammatical Information might Conceivably be Innate? Do Children follow Rules when they Learn to Speak? Exactly how do Children Learn Language? Why Propose a Transformational Grammar? Do we Need a Transformational Grammar in order to Speak? How do

we Understand Speech? How do we Plan and Produce Speech? Psycholinguistic Perspective on Memorization, The Psycholinguistics of Bilingualism, The Future of Psycholinguistics



ENG-106 Short Fiction

The Nightingale and the Rose by Oscar Wilde, The Three Strangers by Thomas Hardy, The Cask of Amontillado by Edgar Allan Poe, The Darling by Anton Chekhov, Hearts and Hands by O' Henry, The Necklace by Guy De Maupassant, The Secret Sharer by Joseph Conrad, The Other Side of the Hedge by E. M. Forster, Eveline by James Joyce, The Three Questions by Leo Tolstoy, A Hunger Artist by Franz Kafka, A Very Old Man With Enormous Wings by Gabriel

Garcia Marquez, Two Words by Isabel Allende, A Cup of Tea by Katherine Mansfield, Everything that Rises Must Converge by Flannery O'Connor, The Story of an Hour by Kate Chopin, The Richer The Poorer by Dorothy West, The Prisoner Who Wore Glasses by Bessie Head, Lamb to the Slaughter by Roald Dahl, Bingo by Tariq Rahman, The Kingdom of Cards by Rabindranath Tagore, The Martyr by Ngũgĩ wa Thiong'o, A Watcher of the Dead by Nadine Gordimer, Revelation by Flannery O'Connor, Nawabdin Electrician by Daniyal Mueenuddin

MT-107 Maths

For contents, please refer to page number 165.

EC-110 Computing Fundamentals

For contents, please refer to page number 77.

ENG -201 Literary Theory and Criticism

Aristotle to Modern Times: The Greek Critics: Plato (427-347 BC): Selections from The Republic (c. 380 BC), Aristotle (394-322 BC): The Poetics (c. 335 BC); Renaissance to Eighteenth Century Critics: Sir Philip Sidney (1554-1586): An Apology for Poetry (1595), John Dryden (1631-1700): Essay on Dramatic Poesy (1668), Samuel Johnson (1709-1784): "From Milton" (1779-81); The Romantic Critics: William Wordsworth (1770-1850): Preface to Lyrical Ballads (1798-1802), S.T. Coleridge (1772-1834): Biographia Literaria (Chapters 14-18) (1817); The Victorian Critics: Matthew Arnold (1822-1888): The Study of Poetry, Culture and Anarchy (Chapter 1) (1880) & Function of Criticism at the Present Time (1865), Walter Pater (1839-1894): Appreciations: "On Style" (1895) (Optional); Modern Critic: T.S. Eliot (1888-1965): "Tradition & the Individual Talent" (1921) & Religion and Literature; A Brief Introduction to Contemporary Literary Theories

IS-211 Islamic Studies

For contents, please refer to page number 172.

HS-103 Communication Skills

For contents, please refer to page number 24.

HS-404 Foreign Language

For contents, please refer to page number 30.

ENG -202 Classical and Elizabethan Drama

Sophocles: Oedipus Rex, Aeschylus: Agamemnon & Prometheus Bound, Christopher Marlowe: Dr Faustus, Tamburlaine the Great & Jew of Malta, Shakespeare: Macbeth, Twelfth Night, Othello & King Lear, Webster: The Duchess of Malfi

ENG -203 Classical Poetry

Geoffrey Chaucer: The Prologue to the Canterbury Tales; John Milton (1608-1674): Paradise Lost. Book I, Paradise Lost Book 9, On His Blindness; Alexander Pope (1688-1744): Rape of the Lock, John Donne (1572-1631): Love Poems: Song, The Sun Rising, Aire and Angels, The Good Morrow, Valediction: Forbidding Mourning, Holy Sonnets: Thou hast made me, and shall thy work decay? Death be not proud, though some have called thee; William Shakespeare (1564-1616): Shall I compare thee to a summer's day? Let me not to the marriage of true minds

ENG -204 Introduction to Phonetics and Phonology

Basic definitions: Phonetics, Articulatory, Auditory & Acoustic Phonetics, Phonology, Phoneme, Vowels, Consonants, Diphthongs, Triphthongs, Voicing, Aspiration, Minimal pairs; Organs of Speech, Phonemes, Consonants

(place and manner of articulation), Vowels (vowel trapezium/quadrilateral), Monophthongs, Diphthongs , Triphthongs, Rules, Voicing, /r/, /ŋ/; Practice of phonemic transcription; Definitions: Homophones, Homographs, Homonyms, Homophenes; Fluency Devices: Assimilation, Elision, Weak forms/Strong forms, Linking; Sound Values, Stress and Intonation.

ENG -205 Sociolinguistics

Introduction to Sociolinguistics: Scope and ramifications of sociolinguistics, Theories of sociolinguistics, Language in culture and culture in language; Language and Context: Social Class and Region, What is traditional sociolinguistics? Language Varieties, What do we mean by language variation? Code, Dialect, Sociolect, Idiolect; Isogloss; Language Society and Culture: Functions of Language in Society, Domains of Language Use, Speech Community, Regional & Social dialects, Style, Register; Jargon, Pidgins & Creoles, National Language, Standard Language, Language, Culture and Thought; Multilingualism and Bilingualism: Societal multilingualism, Dimensions of bilingualism, Bilingualism, Causes of bilingualism, Manifestations of bilingualism (borrowing, code-switching, code-mixing); Effects of bilingualism: Language conflicts, Language attitudes, Language maintenance , Language shift, Language death, Immigrant stories, Assimilation, integration, separation and marginalization; Language and Gender: Men's and women's language, Gender issues in classroom and society; Language and Power: Diglossia, Critical language awareness; Language-in-education Planning: What does planning involve? The issue of the selection of national and official language(s); Language conflicts and politics in South Asia

ENG -206 Pragmatics

Speech act theory complex speech acts, Felicity conditions, Conversational implicature, The cooperative

principle, Conversational maxims, Relevance, Politeness, Phatic tokens, Deixis

ENG -207 Novel

Henry Fielding: Joseph Andrews (1742); Jane Austen: Pride and Prejudice (1813); Charles Dickens: Hard Times (1854) & The Great Expectations; George Eliot: The Mill on the Floss (1860); Thomas Hardy: The Return of the Native (1878) & Tess of the D'Urbervilles; Daniel Defoe: Robinson Crusoe

ENG -208 Post-Colonial Literature

Edward Said: Orientalism (Introduction and selected chapters); Ashcroft et al: Empire Writes Back ;John Mcleod: Beginning Postcolonialism; Derek Walcott: A Far Cry from Africa (1962); Louise Bennett: Selected Poems (1983); Wole Soyinka: Mandela's Earth and Other Poems (1988) & Brother Jero; A.K. Ramanujan: Collected Poems (2011); Wole Soyinka: A Dance of the Forests (1963); Derek Walcott: Dream on Monkey Mountain (1970); Jack Davis: Honey Spot (1985); Chinua Achebe: Things Fall Apart (1958); Joseph Conrad: Heart of Darkness; Nadine Gordimer: July's People; Doris Lessing: The Grass is Singing; Jean Rhys: Wide Sargasso Sea (1966); Bapsi Sidhwa: Ice Candy Man; Nadeem Aslam: Season of the Rain Birds; Arundhati Roy: The God of Small Things; Hanif Kureishi: My Son the Fanatic; Frantz Fanon: "On National Culture" from The Wretched of the Earth; Edward Said: "Introduction" to Culture and Imperialism; Gauri Viswanathan: "The Beginning of British Literary Study in British India" from The Masks of Conquest; Sara Suleri: "The Rhetoric of English India"; Ngugi wa Thiong'O: "On The Abolition of the English Department"; Derek Walcott: The Schooner Flight, A Far Cry from Africa, and A Lesson for This Sunday; Ben Okri: An African Elegy; Margrate Atwood: Progressive Insanities of a Pioneer Play

ENG -209 Prose

Bacon: Essays Selection, John Ruskin: War & Work, Lytton Strachey: Dr Arnold or Florence Nightingale, B. Russell: Selection from Skeptical Essays, The Value of Scepticism, The Harms that Good Men Do, Eastern and Western Ideals of Happiness, The Conquest of Happiness, Authority Versus Freedom in Education; Swift: Gulliver's Travels (First and last voyage); The Property of Women by Sara Suleri; The Man of the Crowd by Edgar Allan Poe; The Dead by James Joyce; The Man who Loved Islands by D H Lawrence; The Voice by V S Princhett; The Woman who had Imagination by Bates; The Man who Lived in a Shell by Anton Chekov; Civil Peace by Chinua Achebe; Once Upon a Time by Nadine Gordimer; The Judgment by Franz Kafka; Strong Horse Tea by Alice Walker

ENG -210 Stylistics

Introduction: What is stylistics? Historical Evolution of Stylistics, The Nature of Stylistics, The Goals of Stylistics; The concept of style and stylistics: Meaning of stylistics and its approaches; Types of Stylistics; Levels of Linguistic Analysis: The Lexico-Semantic Level; Levels of Linguistic Analysis: The Syntactic Level; Foregrounding; Stylistic analysis: Practical Application;

ENG -211 Morphology and Syntax

Introduction to morphology, Basics of Phonetic Transcription of Words, Inflectional Morphology, Derivational Morphology, Syntax, Structure of Phrase, Clause, Grammatical Functions, Head, Complements and Modifiers, Constituents and Tree diagrams, Phrase Structure Grammar, Basics of Systemic Functional Linguistics



ENG -212 Romantic and Victorian Poetry

William Blake: The Sick Rose, London, A Poison Tree, The Tygre; William Wordsworth: The World is Too Much with us, Ode to Intimation of Immortality, We Are Seven, The Last of The Flock; S.T. Coleridge: Dejection: An Ode, Frost at Midnight, Christabel, Kubla Khan; John Keats: La Belle Dame Sans Mercy, A Thing of Beauty, Ode on Melancholy, Ode to Nightingale, Ode on the Grecian Urn; Lord Byron: She Walks in Beauty, When We Two Parted, I Watched Thee, So We'll go No More A Roving; P.B. Shelly: Ode To The West Wind, Ozymandis, Ode To A Sky Lark, The Indian Serenade, Love's Philosophy, Alfred Lord Tennyson, The Lotos Eaters, St Agnes Eve, Tears Tears Idle Tears; Robert Browning: Porphyria's Lover, My Last Duchess ; Mathew Arnold: Lines Written in Kensington Garden,

Dover Beach ; Dante Gabriel Rossetti: The Choices 1, 2, 3; Cristina Rossetti: Song, After Death, In an Artist's Studio ; Algernon Charles Swinburne: Choruses from Atlanta In Calydon From the Triumph of Time, I Will Go Back to the Great Sweet Mother

ENG-301 Literary Theory and Practice

Defining Literary Criticism, Theory and Literature; Tracing the Evolution of Literary Theory and Criticism: Plato to Plotinus, Dante Alighieri to Boccaccio, Sidney to Henry James, Bakhtin and modern literary criticism; Russian Formalism and New Criticism: Russian Formalism; Reader-Oriented Criticism; Structuralism; Deconstruction; Psychoanalysis; Feminism; Marxism; Cultural Poetics or New Historicism; Postcolonialism; Ecocriticism.

ENG -302 Modern Drama

Henrik Ibsen: A Doll's House, (1879); G. B. Shaw: Arms and the Man (1894) & Man and Superman (1905); Samuel Beckett: Waiting for Godot, (1953) ; Bertolt Brecht: Life of Galileo (1943) ; Harold Pinter: The Caretaker (1960) ; Anton Chekov: Cherry Orchard (1904);

ENG -303 Modern Poetry

T. S. Eliot: The Hollow Men, The Waste Land, The Love Song of J. Alfred Prufrock; Ezra Pound: In a Station of the Metro, A Girl, An Immortality; W.B. Yeats: Among School Children, Second Coming, Easter 1916; W.H Auden: Sep 1st, 1939, As I Walked Out One Morning, The Unknown Citizen; Ted Hughes: That Morning, Hawk Roosting, Thought Fox, Hawk's Monologue; Philip Larkin: Mr. Bleaney, Church Going;

ENG -304 Pakistani Literature in English

Fiction: Bapsi Sidhwa: An American Brat, Ice Candy Man,

Kamila Shamsie: *Burnt Shadows*, Mohsin Hamid: *How To Get Filthy Rich in Rising Asia*, Mohammad Hanif: *Our Lady Of Alice Bhatti*, Nadeem Aslam: *The Blind Man's Garden*; Poetry: Zulfiqar Ghose: *Disturbed Nights and Evidence of Genocide*, Salman Tarik Kureshi: *Cottage, Housewarming and End of The Climb*, Adrian A. Hussain: *A Rosary of Ants, Autumn Tree*, Moen Farooqi: *Unfamiliar Morning, Winter Visit, and The Still life of Apples*, Taufiq Rafat: *Wedding in the flood, Kitchens, Gangrene, Snake, Grave in the park, Reflections, Time to Love, and Arrival of the Monsoon*, Farida Faizullah: *On being offered a Rose by a Student*; Screen Play: Hanif Qureshi: *My Son the Fanatic*;

Essays: Zulfiqar Ghose: *Orwell and I, Intizaar Hussain: The Problems of Pakistani Identity, Bapsi Sidhwa: Launching the Angels, Rukhsana Ahamd: The Price of freedom, Shahid Suhrwardy: The Responsibility of Writers in Pakistan; Contemporary Short Stories: Muneeza Shamse: That Heathen Air and And the World Changed, Aamer Hussain: The Keeper of the Shrine and A Needlewoman's Calender, Kamila Shamsie: Hasan and The Sky and 9/11 Stories: Our Dead Your Dead, Daniyaal Muenudin: Nawab Din Electrician, Bapsi Sidhwa: The Trouble-Easers, Zaibunisa Hamidullah: Maa;*

HS-403 International Relations

For contents, please refer to page number 173.

ENG -305 Modern Novel

Joseph Conrad: *The Heart of Darkness (1899-1902)*; E.M. Forster: *A Passage to India (1924)*; Virginia Woolf: *To the Light House (1927)*; James Joyce: *A Portrait of the Artist as a Young Man (1916)*; William Golding: *Lord of the Flies (1954)*;

ENG -306 Literature of War and Conflict

American Civil War: *Gone with the Wind*: Margaret Mitchell, *The Red Badge of Courage*: Stephen Crane; WWI & WWII – Trauma, the Holocaust and the Vietnam War: *Absurdist Drama: Endgame*: Samuel Beckett, Poetry selection: *The Charge of the Light Brigade*, etc. *Eye of the Needle*: Ken Follet, *Dispatches*: Michael Herr, *Ceremony*: Leslie Marmon Silko, *Slaughterhouse Five*: Kurt Vonnegut, Jr. *Catch 22*: Joseph Heller; *Afghan Wars and the War on Terror– Occupation, Orientalism (Race and Empire), the Politics of Cultural Identity; The Reluctant Fundamentalist*: Mohsin Hamid; *Kite Runner*: Khalid Hosseini; *A Case of Exploding Mangos*: Mohammad Hanif; *The Blind Man's Garden*: Nadeem Aslam; *Kartography*: Kamila Shamsie; *Extremely Loud and Incredibly Close*: Johnathan Safron Foer;

ENG-307 TEFL

Culture and Acculturation; Theories of Second Language Acquisition; Class Room Management; Lesson Planning; Teaching Vocabulary; Use of A.V aids; Error Analysis and Testing; Teaching with Drama; Teaching Pronunciation; Classroom Observation; Classroom Dynamics; Microteaching; Reflective Teaching;

ENG -308 World Englishes

Introduction; English as a global language; Language variations and discourse; language variety and culture; English in the world: Its spread, functions and status; The three circles of English; Some features of New English; British and American English; English in South-East Asia; Pakistani English; Indian English; Debates and issues the prejudices associated with different varieties of English; The role of teachers and educational institutions in creating, maintaining, and challenging prejudice; The future of English;

ENG -309 American Literature

Essays and Short Stories; Poetry: Emily Dickinson (1830-1886); Ezra Pound (1885-1972); T.S. Eliot (1888-1965); Robert Frost (1874-1963); Edward Estlin Cummings (1894-1962); Hart Crane (1899-1932); Novel: Harriet Beecher Stowe (1811-1896); F. Scott Fitzgerald (1896-1940); Ernest Hemingway (1899-1961); William Faulkner (1897-1962); Drama: Eugene O'Neill (1888-1953); Arthur Miller (1915-2005);

ENG -401 Introduction to Women's Writings

Poetry (across ages and cultures): Sappho: "I have not had one word from her", Marge Piercy: "The Woman in the Ordinary", Maya Angelou: "Woman Work", Adrienne Rich: "Aunt Jennifer's Tigers" & "Diving into the Wreck", Julia Alvarez: "Ironing Their Clothes", Carolyn Kizer: "Fearful Women.", Carol Ann Duffy: "Little Red Cap", Nelly Wong: "When I Was Growing Up", Mary Hope Lee: "On not Bein", Cherrie Moraga: "For the Color of My Mother", Maki Qureshi: "Kittens" and "For my Grandson", Hina Faisal Imam: "Motherhood and Frustration; Fiction: Louisa May Alcott: Little Women, (1868), Charlotte Bronte: Jane Eyre (1847), Kate Chopin: The Awakening (1898), Zora Neale Hurston: Their Eyes Were Watching God (1937), Anita Desai: Clear Light of Day, (1980), Alice Walker: The Color Purple, Buchi Emecheta: The Joys of Motherhood (1979), Arundhati Roy: The God of Small Things (1997), Chimamanda Ngozi Adichie: Americanah (2013), Toni Morrison: Jazz (1992) or Home (2012), Bapsi Sidhwa: The Pakistani Bride (1990), Shazaf Fatima Haider: How it Happened (2012), Azar Nafisi: Reading Lolita in Tehran, Qaisra Shahraz: The Holy Woman (2001); Short Fiction: Charlotte Perkins Gilman: "The Yellow Wallpaper" 1973 [1892], Margaret Atwood: "Uncles" from Wilderness Tips (1991), Kamala Das: "The Kept Woman" (2010), Qaisra Shahraz: "A Pair of Jeans" from A Pair of Jeans (2013),

Rukhsana Ahmad: "The Gate Keeper's Wife" from The Gatekeeper's Wife (2014), Bharati Mukherjee: "Wife" from The Middleman and Other Stories (1988), Zaib-Un-Nissa Hamidullah: "The Bull and the She Devil," from The Young Wife (1958), Muneeza Shamsie: "Shahrazad's Golden Leopard" in A Dragonfly in the Sun (1998); Drama: Sarah Kane: Crave, from Complete Plays (2001), Rukhsana Ahmad: Song for a Sanctuary (1990); Non-Fiction: Fatima Mernissi: Beyond the Veil (1975), Anne Sofie Roald: Women in Islam: The Western Experience (2001), Leila Ahmed: A Quiet Revolution: The Veil's Resurgence, from the Middle East to America (2011);

ENG -402 Twenty First Century Literature

Irvine Welsh: The Acid House and Other Stories; Sarah Hall: The Beautiful Indifference: Stories; Bennett: The History Boys (play); Muhammad Hanif: What Now, Now That We Are Dead? (play); David Mitchell: Cloud Atlas; Michael Donaghy: Black Ice and Rain; Simon Armitage: The Shout; Carol Ann Duffy: Text; Don Paterson: Rain; Chimamanda Ngozi Adichie: Half of a Yellow Sun; Roddy Doyle: The Deportees and Other Stories; Mohsin Hamid: Exit West; Kyung Sook-shin: Please Look After Mom; Muneeza Shamsie: And the World Changed; Jhumpa Lahiri: Unaccustomed Earth; Niaz Zaman: New Age Short Stories; Yiyun Li: A Thousand Years of Good Prayers; Manjushree Thapa: Tilled Earth: Stories; Aravind Adiga: The White Tiger; Mohammed Hanif: Red Birds; Tanaz Bhathena: The Beauty of the Moment;

ENG-403 Language, Gender, and Culture

Relationship between language, gender and society; In what ways do men and women use language differently? How do these differences reflect and/or maintain gender roles in society? The primary linguistic approaches to gender and language; Historical and contemporary issues and controversies in the field of language and

gender; Different perspectives on language and gender: linguistic, anthropological, sociological, psychological, feminist; Relationship between language and culture; Role of language and culture in the formation of identity; The issue of identity in multicultural societies; Ethnic conflicts; Linguistic conflicts; Problems of linguistic inequality; Linguistic imposition; Cross-cultural communication; Culture shock

ENG -404 Applied Linguistics

Theories of language learning; The nature of approaches and methods in language learning; Error Analysis; Nature and purpose Causes of errors; Contrast between Behavioristic and Mentalistic attitude to errors Stages of error analysis; Definition and scope of syllabus; Considerations common to all syllabuses; Relationship between theory of language, language learning and language syllabuses; Dichotomies of Syllabuses; Product vs. Process-oriented syllabuses; Analytical Synthetic syllabuses; PRODUCT-ORIENTED SYLLABUSES: Grammatical Syllabus, Notional Functional Syllabus; PROCESS-ORIENTED SYLLABUSES: Procedural, Process Syllabus; Objectives: Types and Criticism; Needs analysis for syllabus designing;

ENG -405 Creative Writing

Writing Process: Invention, Ordering Information, Drafting, Paraphrasing, Cohesion and Coherence, Creative Writing, Use of various rhetorical modes including exposition, argumentation and analysis, The Art of the Personal Essay: An Anthology from the Classical Era to the Present, edited by Phillip Lopate, The Touchstone Anthology of Contemporary Creative Nonfiction, edited by Williford & Martone, The Literary Journalists, edited by Norman Sims. This Boy's Life by Tobias Wolff, The Lyrical Essay: The Seneca Review : Description and examples of the lyrical essay at Seneca Review, McSweeney's Internet Tendency: fiction, art, comics, creative nonfiction,

columns, opinions, and much more, Tell It Slant: Creating, Refining, and Publishing Creative Nonfiction, (2nd Edition) by Brenda Miller and Suzanne Paol;

ENG-310 Shakespearean Plays

As You Like It; Henry IV Part I; The Tempest; Hamlet; The Winter's Tale; King Lear; A Midsummer Night's Dream; Twelfth Night; Romeo and Juliet; Antony and Cleopatra; Julius Caesar; King John; The Merchant of Venice;

ENG-311-World Literature

Sister Juana Ines de la Cruz: A selection of poems and an excerpts of a biographical and feministic letter: Response to Sor Filotea; Octavio Paz: The Labyrinth of Solitude and Mexican Mask; Franz Kafka: The Metamorphosis and The Trial; Albert Camus: The Myth of Sisyphus, The Stranger and The Plague; Dr. Allama Iqbal: Mosque of Cordova and Satan's Council; Faiz Ahmed Faiz: Poems by Faiz: Ghazal, Quatrain and Poems; Federico Garcia Lorca: Blood Wedding and House of Bernarda Alba; Dario Fo: Accidental Death of an Anarchist; Tawfiq al Hakim: The Bird of the East; Elif Shafak: The Flea Palace; Rabindranath Tagore: Selections from Gitanjali; Naguib Mahfouz: Midaq Alley; Jhumpa Lahiri: In Other Words; Fariduddin Attar: The Conference of Birds; Bertolt Brecht: Mother Courage and The Life of Galileo; Jalaluddin Rumi: Selection from Mathnawi (Divan & Discourse; The Song of the Reed / The Artists); Basho (Japanese): Selections of Haiku; Dostoevsky (Russian): Crime and Punishment; Lu Hsun (Chinese), "The Kite" and "After Death"; Cervantes, M (Spanish): Don Quixote (Part 1-Book1&2); Herman Hesse: Siddhartha

ENG -409 African Literature

Chinua Achebe: Anthills of the Savannah; Ama Ata Aidoo: Our Sister Killjoy and Lice; J.M. Coetzee: Waiting for the Barbarians; Bessie Head: A Question of Power; Nadine Gordimer (selective short stories); Nwapa Flora: Efuru;

Tayeb Salih: Season of Migration to the North; Sembène Ousmane Xala: trans. Clive Wake; Soyinka Wole: Death and the King's Horsemen; Thiong'o Ngũgĩ: A Grain of Wheat; Whites Only Bench by Ivan Vladislavic; Lice by Ama Ata Aidoo; Choderlos de Laclos: Dangerous Liaisons; Tahar Ben Jelloun: The Sacred Night, The Sand Child, and This Blinding Absence of Light; Chinua Achebe: Arrow of God, No Longer At Ease, Things Fall Apart, A Man of the People, Anthills of the Savannah; Camara Laye: The African Child (L'Enfant noir), and The Radiance of the King; Naguib Mahfouz: The Beginning and the End and Cairo Trilogy

ENG -410 South Asian Literature

Drama: Tariq Ali: Iranian Nights, Vijay Tendulkar: Silence! The Court in Session, Girish Karnad: The Dreams of Tipu Sultan; Fiction: Kamila Shamsi: Salt and Saffron; Khalid Hosseini: The Kite Runner; Bapsi Sidhwa: And American Brat; Anita Desai: The Inheritance of Loss; Daniyal Moenudin: In Other Rooms Other people; Mohammed Hanif: A Case of Exploding Mangoes; Tagor: Home and the world; Tahmina Anam: The Golden Age; Arundhatti Roy: The God of Small Things; Amitav Ghosh: Sea of Poppies (2008) and The Shadow Lines (1988); Bapsi Sidhwa: Cracking India (1991) and An American Brat (1993); Jhumpa Lahiri: The Namesake (2004); Kamila Shamsie: Burnt Shadows (2009); Khushwant Singh: Train to Pakistan (1956); Akhtaruzzaman Elias: The Festival; Amar Jalil: The Bird; Saadat Hasan Manto: Selection from Black Margin; Selina Hossain: Spent; Farkhanda Lodhi: Cracks in the Heart; Poetry (selections): Zulfiqar Ghose; Naseem Ezekial; Maki Qureshi; Sujata Bhatt;

ENG -312 Critical Discourse Analysis

Discourse as a social and political enterprise; Different Approaches to CDA: Michel Foucault, Norman Fairclough, Van Dijk, Ruth Woda; Common Features of CDA; airclough's critical discourse analysis; Difference between

CDA and PDA; Application of CDA on diverse texts;

ENG -411 Computational Linguistics

Introduction: Computer in linguistics, Parsing and generation strategies, Implementation of strategies, Computational complexity; Computational phonetics and phonology; Computational Morphology; Computational Syntax; Computational Lexicology: Computational Semantics, Applications of computational linguistics;

ENG -412 Semantics

Early theories of meaning (Ogden and Richards; Ferdinand de Saussure) • Types of meaning; Semantic field; Componential analysis; Sense Relations and Lexical Relations (Hyponymy; Synonymy; Antonymy; Homonymy and Polysemy); Syntactic Semantics (Contradiction, Ambiguity, Semantic anomaly, Entailment, Presupposition)



Department of Management Sciences

Management Sciences deal with the application of scientific methods in contemporary organizations. The essence of Management Sciences rests in its practicability in problem solving and decision making by using qualitative and quantitative methods. Business education is one of the most sought after degree program in the country, irrespective of the economic situation a business administration degree can always help in realization of dreams.

The Department of Management Sciences at HITEC University is established with the aim of producing graduates that can lead and guide the society with vision and have the ability and skills acquired through appropriate training to manage its resources effectively and cater for the needs and requirements of national and international organizations.

At HITEC University in general and Department of Management Sciences in particular, our vision is to inspire

curiosity within our students and drive positive change within all fields of study. We are committed to producing forward-thinking managers and leaders that impacts the lives of real people and businesses.

In order to achieve this objective a special importance has been given in designing business curriculum which is developed by highly competent professionals to ensure comprehensive and wide array of subjects to manage the needs of the dynamic business world. The curricula and syllabi is designed according to the guidelines of Higher Education Commission and the requirements of business world.

Department of Management Sciences provides a conducive environment to faculty and students to engage with industry professionals and feel part of corporate learning community and are able to thrive and achieve their best work.



Bachelor of Business Administration Curriculum

The Education Objective of this program is to equip students with knowledge and skill set so that they should be able to contribute competently and efficiently as business professionals and to demonstrate cross-discipline knowledge of core business functions and exhibit preparedness to work in a diversified work environment, respective different cultural values and work ethically.

The undergraduate program (BBA) is developed with a clear objective to produce future managers, with strong theoretical knowledge and leadership & management skills. Due emphasis is placed upon development of entrepreneurial spirit and leadership qualities to create managers with high competence and ethical values. A unique combination has been adopted to create managerial skills, confidence building and decision making.

The undergraduate program is of eight semesters spread over a period of four years and the curriculum is designed to enable students to work effectively in a business environment that has become increasingly more complex. The programs offers specialization opportunities to students in areas like Marketing, Human Resource and Finance.

The students will be required to undergo 8 weeks of Noncredit Internship in a business organization during the summer break after sixth semester and to engage in Community Service in line with the program designed by the Directorate of Student Affairs of the University,

Students will have the opportunity to work on a business project in 7th and 8th bringing in all their knowledge gained in the first six semesters of four year program and will address real life business problems.

Semester-1

| Course code | Course Title | Credit Hrs |
|---------------------------|--------------------------|------------|
| IT-101 | IT in Business | 2 + 1 |
| HS-101 | English | 3 + 0 |
| MT-108 | Business Mathematics | 3 + 0 |
| IS-211 | Islamic Studies | 2 + 0 |
| MKT-101 | Principles of Marketing | 3 + 0 |
| MGT-101 | Principles of Management | 3 + 0 |
| Total Credit Hours | | 17 |

Semester-2

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------|------------|
| ECO-101 | Micro Economics | 3 + 0 |
| HS-103 | Communication Skills | 3 + 0 |
| ACC-101 | Financial Accounting - 1 | 3 + 0 |
| HS-102 | Pakistan Studies | 2 + 0 |
| MT-109 | Business Statistics - 1 | 3 + 0 |
| HS -106 | Introduction to Sociology | 3 + 0 |
| Total Credit Hours | | 17 |

Semester-3

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------|---------------|
| ACC-102 | Financial Accounting-II | 3 + 0 |
| MGT-204 | Human Resource Management | 3 + 0 |
| ECO-201 | Macro Economics | 3 + 0 |
| HS-202 | Oral Communication | 3 + 0 |
| MGT-201 | Organizational Behavior | 3 + 0 |
| MT-205 | Statistical Inference | 3 + 0 |
| HS-203 | Community Service | 0 + 1 (NC) |
| Total Credit Hours | | 18 |

Semester-4

| Course code | Course Title | Credit Hrs |
|---------------------------|----------------------------|------------|
| MGT-205 | Business Ethics | 3 + 0 |
| HS-107 | Introduction to Psychology | 3 + 0 |
| FIN – 301 | Business Finance | 3 + 0 |
| HS-204 | Business Communication | 3 + 0 |
| MKT-201 | Marketing Management | 3 + 0 |
| FIN-201 | Cost Accounting | 3 + 0 |
| Total Credit Hours | | 18 |

Semester-5

| Course code | Course Title | Credit Hrs |
|---------------------------|----------------------------------|------------|
| FIN-202 | Financial Management | 3 + 0 |
| MGT-301 | Business Law | 3 + 0 |
| MIS-201 | Management Information System | 3 + 0 |
| HS-303 | Personal Management and Grooming | 3 + 0 |
| MGT-302 | Business Research Methods | 3 + 0 |
| MKT-301 | Consumer Behavior | 3 + 0 |
| Total Credit Hours | | 18 |

Semester-6

| Course code | Course Title | Credit Hrs |
|---------------------------|-------------------------------|------------|
| HS-405 | Entrepreneurship & Innovation | 3 + 0 |
| MGT-304 | Operations Management | 3 + 0 |
| FIN-302 | Money and Banking | 3 + 0 |
| HS-304 | Pakistan Economy | 3 + 0 |
| MGT-305 | Strategic Management | 3 + 0 |
| HS-302 | International Relations | 3 + 0 |
| Total Credit Hours | | 18 |

Summer Internship

Eight-week internship during summer vacations after Sixth semester

Semester-7

| Course code | Course Title | Credit Hrs |
|---------------------------|-----------------------------------|------------|
| MGT-401 | International Business Management | 3 + 0 |
| HS-404 | Foreign Language | 1 + 1 |
| HS-405 | Logic & Critical Thinking | 3 + 0 |
| XXX | Specialization - I | 3 + 0 |
| XXX | Specialization - II | 3 + 0 |
| MGT-499 | Final Year Project | 3 + 0 |
| Total Credit Hours | | 17 |

Semester-8

| Course code | Course Title | Credit Hrs |
|---------------------------|---------------------------|------------|
| MGT-211 | Cross Cultural Management | 3 + 0 |
| XXX | Specialization – III | 3 + 0 |
| XXX | Specialization – IV | 3 + 0 |
| MGT-499 | Final Year Project | 3 + 0 |
| Total Credit Hours | | 12 |



List of Electives (Marketing)

| Course code | Course Title | Credit Hrs |
|-------------|----------------------------------|------------|
| MKT-401 | Brand Management | 3 + 0 |
| MKT-402 | Service Marketing | 3 + 0 |
| MKT-403 | International Marketing | 3 + 0 |
| MKT-404 | Retail Marketing | 3 + 0 |
| MKT-405 | Customer Relationship Management | 3 + 0 |
| MKT-406 | Advertising | 3 + 0 |

List of Electives (Finance)

| Course code | Course Title | Credit Hrs |
|-------------|------------------------------------|------------|
| FIN-401 | Corporate Finance | 3 + 0 |
| FIN-402 | Commercial and Investment Banking | 3 + 0 |
| FIN-403 | Security and Portfolio Analysis | 3 + 0 |
| FIN-404 | Financial Markets and Institutions | 3 + 0 |
| FIN-405 | International Finance | 3 + 0 |
| FIN-406 | Analysis of Financial Statements | 3 + 0 |

List of Electives (HRM)

| Course code | Course Title | Credit Hrs |
|-------------|--------------------------------------|------------|
| HRM-401 | Recruitment & Selection | 3 + 0 |
| HRM-402 | Training & Development | 3 + 0 |
| HRM-403 | Performance Management | 3 + 0 |
| HRM-404 | Negotiations and Conflict Management | 3 + 0 |
| HRM-405 | Change Management | 3 + 0 |
| HRM-406 | Human Resource Development | 3 + 0 |

Course Contents

HS-101 English

For contents, please refer to page number 24.

MT-108 Business Mathematics

Mathematics Notations, Introduction to Submission, Multiplication, Linear Equation involving one variable, Quadratic Equations, Linear Equations, Determining the Equation of a Straight Line Linear Equations involving more than two variables, Two variables Systems of Equations, Applications of Linear Equations and Systems of Equations, Nonlinear functions and their applications, Polynomial and Exponential Equations, Matrices and its types, Determinants.

IS-211 Islamic Studies

For contents, please refer to page number 172.

MKT-101 Principles of Marketing

Introduction to marketing, marketing and the society, marketing environments, marketing strategy, marketing decisions, consumer behavior, consumer decision process, Influence of social and psychological factors, market segmentation and targeting, products and services, product development and life cycle, setting the price and relating the strategies, pricing techniques, distribution strategy, promotion, advertising and publicity, introduction to e-business.

MGT-101 Principles of Management

Introduction to Management, Organization, The History and evaluation of Management, Organizational theories and different approaches to management, The organizational Culture and the Manager, The external environment

and the internal environment and the manager, Foundations and basic elements of Planning, MBO, Effective strategic planning, Decision Making, The manager's role as decision maker, Basics of Strategic Management, and its process, Human Resource Management, HRM processes, Motivation and its theories, Current issues in Motivation, Team work and Group Behavior, Leadership and its characteristics, Leadership styles and behaviors, The process of Control, The Control Standards, Staffing.

ECO-101 Micro Economics

Economics and its Basic Themes and Nature, Micro versus Macro Economics, Economic problem of resource allocation, Economics relevance to business organizations, Demand and Supply Analysis, Elasticity of demand/supply and its measurement, Cardinal approach and consumer equilibrium, Ordinal approach and consumer equilibrium, Price, Income and Substitution effects on consumer equilibrium, Production Analysis, Short-run and long-run production, Cost and Revenue Analysis, The cost of production: Short-run cost, long-run cost, Least-cost factor combination, Revenue and revenue curves: Total, average and marginal revenues, Market structures and Pricing, Price and out-put under perfect competition, monopoly, duopoly, oligopoly and monopolistic competition, The theory of Marginal Productivity, Market demand for resources.

HS-103 Communication Skills

For contents, please refer to page number 24.

ACC-101 Financial Accounting-1

Accounting and its role, Development of accounting, Financial statements introduction and preparation, Major fields of Accounting, Basic Accounting principles, The Reliability (or Objectivity) principle, The cost Principle, The

Going-Concern Assumptions, The Stable Currency Assumptions, Qualitative characteristics of Financial statements, The adjusting and closing entries, Accounting for trading organization, The Purchase Function, Developing Accounting Systems, Cash and temporary investment, Cash Management and Control, Accounting for debtors and stock, Stock and its measurement, Accounting for property, plant and equipment, Intangible Assets and Amortization.

HS-102 Pakistan Studies

For contents, please refer to page number 173.

MT-109 Business Statistics-1

Introduction, Descriptive Statistics & Inferential Statistics, Statistics Applications in Business, Relative and Cumulative frequency distribution, Graphical Representation, Graphical Representation of the data, Measures of Central Tendency for Grouped and Ungrouped Data, Measures of Dispersion, Mean Absolute Deviation, Defining an Index Number, Basic Set and subsets, Permutation and Combination, Probability and its basic concepts, Mathematical expected value, Decision criterion utility, Probability Distribution and its types, Sample Regression and Correlation.

HS-106 Introduction to Sociology

What is sociology and its importance, the foundation of sociology, the spirit of Capitalism, Overview of Theoretical Perspectives (positivism, structural functionalism, symbolic interaction, consensus/conflict, structure/action, and the postmodern turn), Sociological Research Methods and Approaches to Knowledge, Social Stratification, Forms of social stratification exist in Pakistan, Race, Ethnicity and Migration, Does racism exist in Pakistan? What forms does discrimination take in Pakistan?, The Body, Health,

Illness and Disability, Social Institutions, Education, Work, Family Values, Popular Culture and the Media, Social Processes and Social Change, Globalization, Global Inequality, Social Movements and Social Change.

ACC-102 Financial Accounting-II

Accounting for companies, Market Value of Shares, Share Capital and Share Premium, Ordinary Shares, Preference Shares, Issuance of Shares, Accounting for Issuance of shares, Company final Accounts, Profit & Loss Account, Appropriation Account, Balance Sheet, Accounting for Dividends, Accounting for Bonds and Debentures, Preparation and Interpretation of Cash Flow, Inventories and Revenue recognition, Analysis of Financial Statements, Trend Analysis, Accounting for consolidated statements, Accounting for Partnerships.

MGT-204 Human Resource Management

Introduction to human resource requirements, what is HRM, Why HRM is important, Emerging Human resource management challenges, Trends in HRM, Global vs. local HRM practices, HRM from Islamic and indigenous perspective, Basic Islamic philosophy of managing human resource, Conducting Job analysis, HR Planning, Job Description and Job Specification, Recruiting and selecting employees, Recruitment techniques and sources, Selection tests and Interviewing techniques, Performance appraisals and management, Training and development, Developing careers, Career growth, Managing and Types of compensation, Rewarding performance, Pay for Performance, Designing and administering benefits, Employee relations and benefits.

ECO-201 Macro Economics

Key concepts of Macroeconomics, Objectives and instru-

ments of macroeconomics, Measuring Economic Activity, Measurement of National Income. GDP, NDP, GNP & NNP, Personal Income & Disposable Personal Income, GDP Deflator and a real GDP, National Income as a measure of economic welfare, Consumption and Investment, Consumption, Income and saving, Consumption Function, The Marginal Propensity to Consume and Average Propensity to consume, Classical and Modern approach, Tax multiplier, foreign trade multiplier and super multiplier, Fiscal



and Monetary Policy, Investment Multiplier, Tax multiplier, foreign trade multiplier and super multiplier, Inflation and unemployment, The concept of Business Cycle, Classical theory of International trade (CIT), Modern theory of International trade (H-O-Theorem), Economic Integration and Regional Cooperation, Balance of Payments Accounts, Concept of Disequilibrium.

HS-202 Oral Communication

Introduction to oral communication, Forms and Importance

of oral communication, Analyze your organization and Environment, Oral and written communication : a comparison, Barriers in oral communication, Oral communication in business and in practice, Persuasive Speaking, Usage of Line graphs-Bar graphs, Pie charts etc, Usage of overhead Projectors and VCR etc., Planning and Conducting an Interview, Importance and procedure of note – making, Meetings, symposia/workshops, Oral communication in e-mail and on internet, Group discussion /panel discussion /role of moderator, Communication in personal selling, Report writing and presentation, How to make presentation/control of stage fright, general guidance and allocation of topics to students, Knowing and analyzing audience, Motivating your audience, Planning your Speech, Body Posture, Body Language, Proximity to audience, Panel discussion and Role Play, Debate/Presentation.

MGT-201 Organizational Behavior

What is and Importance of organizational behavior, Foundations of Individual Behavior, Organizational behavior from Islamic and indigenous perspective, Understanding human psychology through the lenses of Quran and Sunnah, Attitudes and Job Satisfaction, Perception and Individual Decision Making, Motivation concept, Motivation: from concept to application, Foundations of Group Behavior, Basic Approaches to Leadership, Contemporary Issues in Leadership, Power and politics, Conflict and negotiation, Functions and Types of organization structure, Organizational structure and its impact on individuals and groups, Organizational culture and individual behavior.

MT-205 Statistical Inference

Sampling distribution of mean with and without replacement, Point and Interval estimation, Hypothesis testing of mean, proportion, variance, Regression and Correlation

Analysis, Linear and Multiple Regression, Hypothesis testing of OLS Estimates, Calculation of Standard error, Chi square test, Test of Independence, Chi Square Test, ANOVA: One and Two Way Classification, Time Series Analysis, Moving Average and Seasonality, Measure of trend and seasonal variations, Time series analysis in forecasting.

MGT-205 Business Ethics

Why Study Business Ethics?, The Nature of Business Ethics, Moral Behavior and its impediments, Foundations of Ethics I: Utilitarianism, Rights and Duties, Justice and Fairness, Ethics of Care, Virtue Ethics, Unconscious Moral Decisions, Prospect Theory, Psychoanalysis, Islamic Ethics, Business & Government: Market vs. Marxism, Competition & Ethics: Monopoly, oligopoly, perfect competition, Business & Environment I: Concerns & Remedies, Corporate Social Responsibility, Ethics of consumer production and Marketing, Ethics and the Employee, Ethics of Job Discrimination.



HS-107 Introduction to Psychology

Perspectives in Psychology, Developmental Psychology-I (Conception to Adolescence), Developmental Psychology-II (Adulthood-Old Age), Social Psychology, Personality Theories, Emotions: Theories & Research, Biological Basis of Behavior, Positive Psychology, Inferential Statistics & SPSS, Psychological Testing, Cognitive Psychology, Mental Health & Psychopathology, Qualitative Research, Research Methods in Psychology, Clinical Psychology, Health Psychology, Organizational Behavior, Cross Cultural Psychology, Educational Psychology.

FIN-301 Business Finance

An Overview of Business Finance, Business finance and financial manager, Forms of business organization, Understanding financial statements and cash flows, The balance sheet, The income statement, Analyzing the financial statements, Using financial statement information, The role and perspectives of the Time Value of Money concept, Impact of higher compounding frequency, Bond and Their Valuation, Stocks and Their Valuation, Price of shares based on earnings, Expected rate of return, Preferred shares and their characteristics, Net present value and other investment Criteria, Introduction to Islamic Finance, Risk and Return, The Cost of Capital, Taxation and capital structure decision, Debt equity ratio, cost of capital and the value of the firm (The MM Propositions), The static trade-off theory, The pecking order theory.

HS-204 Business Communication

Communication in Organizations, The basic communication process, Nonverbal communication, Listening, Role of culture and diversity on communication in the workplace, Qualities of communication within business organizations, Benefits of effective communication in your career, Challenge of communication in the global market, Background

to intercultural communication, Background to intercultural communication, Business communication and the technology, Managing information within organizations, History of technological developments, Challenges to the organization made by new technologies, Managing information outside organizations, Strategies for improving oral presentations, an effective nonverbal delivery, reducing stage fright, Interviewing, The process of preparing effective business messages, Self-Disclosure and Trust, Persuasive Communication, Conflict Resolution and Negotiation, Working in Teams for Success Group Presentations; working in teams, Confidence Building, how to be impressive Personality.

MKT-201 Marketing Management

Overview of Marketing Concepts, The evolution of marketing management, The marketing concept and social responsibility, The importance and scope of marketing, Marketing Information Systems, Demographic dimensions of consumer market, Behavioral dimensions of consumer market, The consumer's and buyer's decision process, An overview of marketing opportunities and target markets, Market segmentation concept patterns & procedure, Market targeting and product positioning, Basic concepts of product planning, The product life cycle: Stages and marketing strategies, New product planning and development, Pricing strategies and policies, Marketing channel decisions, Promotional Strategies, Effective advertising programs, Sales promotion and public relations programs, The strategic personal selling process, Strategic sales-force management.

FIN-201 Cost Accounting

Cost Accounting Concepts and Objectives, The importance of Cost Accounting, Cost Accounting and explain its purpose within an organization, Accumulation of Total

Cost in different departments, Financial accounting and Cost Accounting, Financial Statements The bases for planning and control, Costs: Concepts, Uses and Classification, Costs: Concepts, Uses and Classification, Cost data analysis for the decision making, Product costing preparation, Process costing analysis, process costing analysis, Planning and Control of Factory Overhead, Joint and byproduct casting, Planning and Control of Materials, Planning and Control of Labor, Value Cost and Profit Analysis, Differential Cost Analysis.

FIN-202 Financial Management

Meaning and Scope of Financial Management, Scope of Financial management, The Finance manager and the financial environment, Time Value of Money, Bond and Their Valuation, Share and Their Valuation, Legal Rights and Privileges of Common Stockholders, Types of Ordinary Stock, Risk and Return, The Trade Off between Risk and Return, The Relationship between Risk and Rates of Return, Investment Appraisals, Analysis of Cash Flows, The elements of operating cash flows, payback period, discounted payback period, net present value (NPV), and internal rate of return (IRR), explain the NPV profile, Cash Flow Estimation and Other Topics in Capital Budgeting, Risk Analysis and the Optimal Capital Budget, Capital Structure, Financial leverage, degree of financial leverage, and degree of total leverage, Financial forecasting, Keeping Track of forecasts, Sales Forecast, Financial Statement Forecasting: Constant Ratio Method, Managing Current Assets, Alternative Current Asset Investment Policies, Cash Management, Marketable Securities, Financing current Assets, Sound Working Capital Requires Appropriate Financing, Advantages and Disadvantages of Short-Term Financing, Use in short-Term Financing.

MGT-301 Business Law

Individual and Joint liabilities of the partners for the firm debts, principles governing ownership of the firm's asset and distribution of profits, implied and specific authority of the partners, principle of holding out, Dissolution of the partnership, Definition of a contract, Essential elements of a valid contract, Legal provision governing offers, Rights and Duties of parties, specific performance of the contract, Discharge of the contract, Breach of the contract and remedies, illegal, voidable and void contracts, partnership deeds, rights and duties of partners, partnership distinguished from sole proprietorship and the companies, Individual and Joint liabilities of the partners for the firm debts, Concept of limited liability, Rights of the shareholders, Listed vs. non listed companies, advantages and disadvantages of listing, Nature of the contract of sale, Laws relating to indemnity, guarantees, Evolution and types of Banks, Bill of Exchange and promissory Notes.

MIS-201 Management Information Systems

Introduction to Information Systems in Business, Why business need information technology, Fundamentals of Information System, Solving Business Problems with Information Systems, General Systems Model of the Firm, Computer Software, Hardware (Overview from Managerial Perspective), DBMS, MS Access, IS for Business Operations, Accounting Information System, Decision Support System, Marketing Information System, Transaction Processing System, IS for Strategic Advantage, Fundamentals of strategic advantage, Strategic applications and issues in IT, IS & Artificial Intelligence, Enterprise & Glob-

al Management, Managing IT (Planning & Implementing Change).

HS-303 Personal Management and Grooming

Overview of the Concept of Personal & Professional Grooming, Personality Development & Mindful Personality & Reflexive Personality & Appearance, Personal Compatibility & Communication, Posture & Gesture & Voice & Emotional Intelligence, Culture Intelligence & Social In-



telligence, Spatial Intelligence & Kinesthetic Intelligence, Professional Grooming & Aligning Person with Profession, Professional Grooming & Aligning Person with Profession, Organizational Levels of personal and professional grooming, Corporate Outlook of personal and professional grooming, Corporate & Professional Worlds: Differences & Impact on Grooming Needs.

MGT-302 Business Research Methods

The Role of Business Research, The relevance of Western theories and research for local managers, Why context is important in social sciences, The research process: An overview and key steps, Problem Definition and the Research Proposal, Exploratory Research and Qualitative analysis, Qualitative research and theory building, Survey method and business research, Survey Research: Basic Method of Communication with respondents, Measurement and Scaling Concepts, Questionnaire Design, Sample Designs and Sampling Procedures, Determination of Sample Size, Univariate Analysis, Using SPSS for univariate analysis, Bivariate Analysis: Tests of Differences, ANOVA, Data analysis and interpretation, Regression analysis using SPSS, CFAs and Path analysis using Amos, The Research Report, Managerial decision making and Research, Policy implications for managers.

MKT-301 Consumer Behavior

Concept of consumer behavior, its definition, its practical evolution and the consumer decision making process, Determinants of market segments and their characteristics, Consumer research and decision process, Influences on consumer behavior, Cultural influence on CB, Social class influence on CB, Family life cycle and their influence on CB, Demographics and their influence on CB, Personal Influence on buying behavior, Consumer innovation and adaptation process, Characteristics of B2B Buying Behavior, Organizational Buying Behavior - Consumer Markets.

HS-405 Entrepreneurship & Innovation

Entrepreneurship: An Evolving Concept, Understanding Strategic Issues In Business Plan Development, Understanding The Entrepreneurial Perspective in Individuals, Entrepreneurial Perspective in Organizations – Corpo-

rate, Social Entrepreneurship and the ethical challenges of Entrepreneurship, Innovation: The creative pursuit of ideas, Pathways to Entrepreneurial ventures, legal challenges for entrepreneurial ventures, sources of capital for Entrepreneurial ventures, Assessment of entrepreneurial plan, Marketing challenges for entrepreneurial ventures, Financial preparation for entrepreneurial ventures, Developing an effective business plan, Strategic entrepreneurial growth, Valuation of entrepreneurial ventures, Harvesting the entrepreneurial venture

MGT-304 Operations Management

Introduction to Operations Management, Competitiveness, Strategy, and Productivity, Operations management models, Forecasting Techniques, Product and Service Design: Reliability, Strategic Capacity Planning for Products and Services: Decision Theory, Management of Quality, Quality Control: Acceptance Sampling, JIT and Lean Operations: Maintenance, Supply Chain Strategies, Vendor selection, Internet purchasing, Supplier quality and reliability, Types of Facilities and location analysis techniques, Transportation and distribution system, Project Management, Layout strategy, Designing process and product layouts, Warehousing and storage layouts, Assembly line balancing.

FIN-302 Money and Banking

Nature and definition of money, Types and Evolution of Money, Demand and Supply of Money, Monetary Theories, Inventory Theoretic Approach, Central Banking, Modern banking and creation of money, Control of Credit & money by the Central Bank and the instruments used for it, Commercial Banking and its functions and payment system, Commercial banks and money stock, The organizations and structure of banks, Lending to business firms,

Policies and procedures, Foreign exchange determination, Theory of international trade, Import/export and letters of credit, Trade financing, Islamic Perspective of money and banking.

HS-304 Pakistan Economy

An overview of the economic history, Current emerging issues of Pakistan's economy, Economic problems and challenges faced by Pakistan's economy, Development Planning, unemployment, poverty, income distribution, economic growth, inflation, trade and deficits, public debt and sectorial imbalances, Small, Medium and Large Scale Industries, Population Trend, Birth Rate, Fertility Rate and Infant Mortality Rate, Education, Health, Agriculture Sector, Major Services Hotels and Motels, Tourism and Transportation, Foreign Trade, Monetary Policy, Fiscal Policy, Investment Policy, Inflation, Labor Force, GDP, Capital Markets, Infrastructural Services, Energy Resources.

MGT-305 Strategic Management

Strategy, Competitive Advantage, and Performance, The Strategy Formulation/Formation Process, Strategic Leadership, Identification of Opportunities and Threat, The Nature of Competitive Advantage, Distinctive Competencies, Competitive Advantage and Profitability, Sustaining and Building Competitive Advantage through Functional-Level Strategy, Efficiency, Quality, and Customer Responsiveness, Strategies, Business-Level Strategy and the Industry Environment, Strategy in the Global Environment, Corporate-Level Strategy including Horizontal/Vertical Integration, Outsourcing, and Diversification Implementing Strategy, Corporate Performance, Governance, and Business Ethics, Implementing Strategy across Companies and Countries, Structural and Cultural Barriers to Implementation.

HS-302 International Relations

For contents, please refer to page number 173.

MGT-401 International Business Management

The nature of International Business, Why study global business, The process and theories of internationalization, Cultural Influences on International Business, The International Economic Environment, Theories of international trade and international investment, The International Political and Legal Environment, The Multinational Company, Direct Foreign Investment, International Technology Transfer, International Logistics and Distribution, International Financial Management, International Business Exporting, Joint Ventures, International marketing research and market segmentation.

HS-404 Foreign Language

For contents, please refer to page number 30.

HS-405 Logic and Critical Thinking

Why study logic and critical thinking?, What is critical thinking?, Benefits of critical thinking, Barriers to critical thinking, Characteristics of critical thinkers, What is truth and what it means to know?, Alternative truths and ways of knowing; Distinguish between fact and value; Understand the Knowledge/power nexus of truth, Recognizing Arguments and basic logic concepts, Patterns of Inductive and deductive reasoning, Logical Fallacies: Fallacies of Relevance, Analyzing and evaluating Arguments, When is an argument a good one?, How good is the evidence?, When to refute or accept a premise?, Inductive Reasoning, Finding, Evaluating and Using Resources: Content, Author, Audience, Thinking Critically about the Media.

MGT-211 Cross Cultural Management

The significance of culture for international management and decision making, Comparing cross-cultural and international management, Implications for international management practice, Identifying and responding to differences in culture, Comparing national cultures: The Hofstede's model, strengths and weaknesses of Hofstede's model, Comparing researcher and practitioner views regarding culture, Culture as a factor in people's response to change, How economic factors influence movement in national cultures, Organizational Culture, Culture and Management Communication, The cross-cultural significance of non-verbal communication, Cross-cultural management communications: responding to demographic change, Dispute Resolution and Negotiation, Global Staffing - Cross-cultural Dimensions, Managing for control, global staffing choices – expatriates or local managers?, Staffing international joint ventures – balancing trust and control.

MKT-401 Brand Management

Understand what is a Brand , why do they matter and what are their current challenges & opportunities, Understand what is the CBBE Model, Identifying and establishing Brand Positioning, Application of the concept 'Brand Elements', Impact of Marketing Programs on building BE, – Building a Brand Equity Measurement & Management System, Designing & Implementing Branding Strategies, Introducing & Naming New Products & Brand Extensions.

MKT-402 Services Marketing

Introduction to Services Marketing – Trends & Opportunities, Consumer Behavior Related to Services – Understanding the Service Experience, Pricing of Services & Yield Management, Distribution of Services, Communications for Services, Marketing Mix IV: Designing Service



Environments, Designing Customer Service Processes, Managing Service Personnel, Marketing Implementation I: Understanding Service Quality, Managing Service Quality, Designing & Implementing Effective Customer Feedback Systems, Managing Customer Loyalty, CRM Strategies.

MKT-403 International Marketing

The Scope and Challenge of International Marketing, The Dynamic Environment of International Trade, The Dynamic Environment of International Trade & Cultural Dynamics in Assessing Global Market, Cultural Dynamics in Assessing Global Market, Culture, Management Style, and Business Systems, The Political Environment: Critical Concern & The International Legal Environment: Playing by the Rules, The International Legal Environment, Developing Global Vision through Marketing Research, Economic Development and Pakistan, The Asia Pacific Region, Global Marketing Management: Planning and Organization, Product and Services for Consumers & Business, Interna-

tional Marketing Channels, Integrated Marketing Communications and International Advertising, Personal Selling and Sales Management, Pricing for International Markets.

MKT-404 Retail Marketing

Introduction to Retail Marketing, Strategic Planning in Retailing, Retail Store Types by Ownership, Retail Store Types by Strategy, Non-Store/Non-Traditional Retailing, Targeting Customers, Information Gathering and Processing in Retailing, Trading-Area Analysis, Choosing a Store Location, Merchandise Management and Pricing, Establishing a Retail Image, Promotional Strategy, Managing a Retail Business, Setting-up a Retail business.

MKT-405 Customer Relationship Management

What is Customer Relationship Management?, Impact of IT and Globalization on CRM, Evolution of CRM and Classifications, The Value Pyramid, Customer Interaction Cycle, Customer Profiling and Total Customer Experience, Managing Processes in CRM, Workflow Management, Sales Force Automation (SFA), Opportunity Management, Analytics in CRM, CRM Tools, Implementing CRM in an Enterprise, Factors Affecting CRM Implementation, Phases of CRM Implementation.

MKT-406 Advertising

Advertising: Definition, functions and classifications, The evolution of modern advertising, Advertising and the social, ethical and legal issues, The Marketing Mix and Advertising, The Advertising Research Stages, Advertising strategy determination, Testing and evaluation of advertising, Copywriting and Advertising Strategy, Designing the Advertising, Media Planning and Selection, Advertising Media and its Usage.

FIN-401 Corporate Finance

Long-term Financial Planning and Growth, Financial planning models, External financing and growth, Project Cash Flow for investment decisions, External financing and growth, Estimating NPV Estimates, Project analysis and evaluation, Raising capital, Early stage financing & venture capital, Underwriters, Securitization, Financial leverage and capital structure policy, Capital structure & Cost of Capital, Dividends and its policy, Cash dividend and dividend payment, Establishing a dividend policy, Short-term finance and planning, Establishing a dividend policy, Hybrid financing leasing, Financial & Operating Lease, Valuing Financial Lease, Leasing Versus Purchasing Decision.

FIN-402 Commercial and Investment Banking

Introduction of Banks and the Financial Services, What is commercial and investment banking?, The IB Business of Equities, Debt/Fixed Income, The IB Business of Trading/Derivatives, The Business of Mergers and Acquisitions, The Financial System and Competing Financial Service Institutions, Organization and Structure of Banking and the financial Service Industry, Establishing New Banks, The Financial Statements of Banks and Their Principal Competitors, Performance Indicators among Banking's Key Competitors.

FIN-403 Security and Portfolio Analysis

Investment Settings, Organization And Functioning Of Securities Market, Security market indicator series, Introduction to efficient market hypothesis, An introduction to portfolio management, An introduction to asset pricing models, Analysis of financial statements, Security valuations, Stock market analysis, Industry analysis, Company analysis and stock valuation, Introduction to financial derivatives, Forwards, Futures, Options & Swaps.

FIN-404 Financial Markets and Institutions

An Overview of Financial System, An Overview of Islamic Financial System, Environments and Regulatory Framework, Globalization of Financial Institutions and markets, Recent developments in the world financial markets, An overview of Financial Institutions in Pakistan, Determination of Interest Rates, Money Markets & Capital Markets, Bond Markets, Mortgage Markets, Capital Markets (Stock Markets), .Other Financial Markets: FOREX Market, Derivative Securities Markets, Commercial Banks and Financial Statement Analysis, Regulation of Commercial Banks, Regulation of Non-Bank Financial Institutions, Insurance Companies, Security Firms and Investments Banks, Mutual Funds and Hedge Funds, Pension Funds, Types of Risks Incurred by Financial Institutions, Managing Credit Risk and Liquidity Risk, Managing Interest Rate Risk and Insolvency Risk on the Balance Sheet, Managing Risk Off the Balance Sheet with Loan Sales and Securitization.



FIN-405 International Finance

Understand unique dimensions of international finance, foreign bank note market, spot foreign exchange market, organization of the interbank spot market, Direct versus indirect exchange and cross exchange rates, understand foreign exchange markets in Pakistan, forward foreign exchange, currency futures and options, influences on currency supply and demand, Understand the factors affecting exchange rates, the absolute (or static) form vs. relative (or dynamic) form vs. efficient markets (or speculative) form of PPP, currency investment and borrowing criteria, stock versus flow approaches to exchange rates determination, importance of currency risk, the effects of exchange rates on exporters and importers, evaluate whether to hedge, diversification benefits of international portfolio investment, A survey of different theories of Foreign Direct Investment, Understand the factors responsible for the growth of MNCs, international equity, dimensions of international trade, financial globalization.

FIN-496 Analysis of Financial Statements

Introduction to AFS and business strategy analysis, Accounting Analysis, Understanding how Different Accounting Rules affects ratios, Financial Analysis, Ratio Analysis, Forecasting Application, Valuation and its models, Predicting Returns at Earnings Announcements, Determinants of Valuation Ratios, Valuation Applications: Merger and Initial Public Offerings.

HRM-401 Recruitment and Selection

Introduction to Recruitment and Selection, Measurement, Reliability and Validity, Legal Issues, Job Analysis and Competency Models, Recruitment & Selection and Job Performance, Recruitment, Applicant Screening, Ability Tests and Personality Assessment, Performance Tests, Assessment Centers, Integrity Testing, Psychometric

Testing, Graphology, The Selection Interview, Strategies for Selection Decision Making.

HRM-402 Training and Development

Introduction & Organization, The Training & Development Process, Organizational Learning, Learning & Motivation, Principles of adult learning including theories of motivation, The Needs Analysis Process, Training Design, Training Implementation and Delivery, Transfer of Training, Training Methods, Various approaches to training, Variety of training and development methods, Training Evaluation, Issues in training evaluation, Costs and Benefits, Training Programs, Training Trends & Best Practices, Cost/benefits (utility) of training programs, Relative cost-effectiveness of various training programs.

HRM-403 Performance Management

What is performance management?, The principles of effective performance management, Overview of the best practice performance management process, Planning Performance, Setting key performance objectives for individuals and teams, Cascading the business plan down through the organization, Understanding the competencies associated with effective job performance, How to set training and development goals, Managing Performance, Monitoring and tracking performance, Coaching and leveraging performance, Diagnosis on management style preferences and exercise on situational management, Appraising Performance, Key issues for effective appraisal, Linking pay with performance.

HRM-404 Negotiations and Conflict Management

What Is Negotiation?, Negotiation Strategies and Biases, Processes and Phases of Negotiation, Managing Different Types of Business Negotiations, Conflict Resolution, Inter-

national and Cross Cultural Negotiation, Theory, processes, and practices of negotiation, conflict resolution, and relationship management, Principles, strategies, and tactics of effective negotiation and professional relationship management, Negotiation theories, Effective negotiation strategies, Effective communication, problem-solving, and influence techniques, How culture impacts negotiations.

HRM-405 Change Management

Images of managing change, Why organizations change, What changes in organizations?, Diagnosing change, Resistance to change, Implementing change, Strategies and skills for communicating change, Understand why change is both a creative and a rational process, Importance of organizational images and mental models, Managing change outcomes, Environmental pressures propelling organizations towards change, Understand and identify reasons for resistance to change, Understand the organization development (OD) and change management approach to change, Understand how successful commu-

nication processes will vary depending on the stage and type of organizational change.

HRM-406 Human Resource Development

Introduction to Human Resource Development, The strategic role of human resource development (HRD), The Learning Organization: traditional forms of HRD, current models and predictions for the future, HRD and employee orientation, Theory and Philosophy in Human Resource Development, Perspectives of HRD, Training Programs: the design, delivery, methods and media, assessment and evaluation of training programs. Adult learning styles and theories and integration with training programs, Organizational development concepts and interventions, Management of talented employees; the need for management development; strategies and trends, Open and distance learning, Developing and Understanding Expertise through Training and Development, Transfer of Learning, Future Issues and Human Resource Development.



DIRECTORATE OF QUALITY ASSURANCE & COLLABORATIONS (QA&C)



Prof. Dr. Tahir Nadeem Malik
Dean

The Directorate of Quality Assurance and Collaborations (QA&C) was established in 2012. Its primary role is to assure quality in synchronism with the Higher Education Commission (HEC) and Pakistan Engineering Council (PEC) guidelines.

The Directorate is also responsible for establishing and monitoring MOUs meant for collaboration with other universities and organizations of repute.

The foremost function of the Directorate is to ensure that teaching, learning and evaluation processes are pursued as per international norms and practices. An extensive system is in place to solicit feedback from the students, faculty and other stake-holders to bring about continual improvement in the quality of education. The feedback also encompasses the quality of administrative support and other allied services available in the University. The accruing data is analyzed in details and short comings are addressed speedily. The Directorate also keeps a record of all the proceedings and furnishes the required information to PEC and HEC on regular basis. This data is also essentially required for accreditation of our academic programs by various regularity bodies.

Outcome Based Education – A Harbinger of Quality

HITEC University has now transformed into an “Outcome Based Education (OBE)” Institute. This shift has added new dimensions to the functions and responsibilities of the Directorate. Therefore, it closely monitors the attainment of “Course Learning Outcomes (CLOs)”, “Program Learning Outcomes (PLOs)” and “Program Educational Objectives (PEOs)” quite diligently.

PEOs are those perceived objectives which our Alumni would be pursuing 4-5 years after graduation. It means HITEC University’s quality of education assures that our graduates would be proficiently practicing their respective professional activities. OBE philosophy essentially requires that all institutions must clearly formulate their PEOs and evidence should be in place to compute level of attainment of those PEOs through feedback from the alumni and their employers.

The HITEC University has defined the following four PEOs:-

- PEO-1 Our graduates will be proficient engineers in industry, academia or manage self-initiated business activity.
- PEO-2 They will exhibit adaptation to advancements in knowledge for creating solutions of complex problems.
- PEO-3 They will contribute as effective team members and managers in their organizations.
- PEO-4 In dealing with others, they will conduct with dignity, integrity and demonstrate commitment to social responsibilities.

In consonance with the universal practice, the quality of an

engineering program must embody the following graduate attributes (also called PLOs). These are:-

- PLO-1 Engineering Knowledge
- PLO-2 Problem Analysis
- PLO-3 Design / Development of Solutions
- PLO-4 Investigation
- PLO-5 Modern Tool Usage
- PLO-6 The Engineer and Society
- PLO-7 Environment and sustainability
- PLO-8 Ethics
- PLO-9 Individual and Team Work
- PLO-10 Communication
- PLO-11 Project Management
- PLO-12 Lifelong Learning

HITEC University ensures that all of its engineering programs must conform to these 12-PLOs.

Measuring the attainment of PLOs is also an essential activity of the directorate of QA&C. Fulfillment of PLOs is dependent on successful achievement of the Course Learning Outcomes (CLOs) meant for each course of study. These are clearly defined goals of every major topic covered in a course.

Foreign Collaborations

The University has very active collaboration with University of Strathclyde, Glasgow, UK, Istanbul Technical University (ITU), Turkey, and Universiti Teknologi Malaysia (UTM).





These collaborations afford unique opportunity for our students and faculty to benefit from the academic programs and R&D activities of these leading universities

Those students who opt for studies at University of Strathclyde will spend the first 02 years at HITEC University and remaining 02 years at Strathclyde. They will be awarded the degree of Bachelors of Science in Engineering by the Strathclyde University. Our MoU with the Strathclyde University also facilitates HITEC graduates to seek admission in M.Sc. and PhD programs and quite a few of them are already pursuing their postgraduate studies. This collaboration has been highly successful and efforts are in hand to broaden the scope and domain of the existing MoU.

Similarly, our students after completion of 06 semesters at HITEC University can opt for one year exchange program at Istanbul Technical University (ITU) and Universiti Teknologi Malaysia (UTM). They will be awarded HITEC

University Degree. The MoU with UTM has propelled HITEC University to be an integral participant of "Asia Technological University Network (ATU-NET) which aims to support member-universities to advance the quality of education and assimilation of international practices. It provides a forum for mutual sharing of ideas and initiatives in academics, research and business development. As of present, ATU-NET comprises prestigious universities of 18 Asian countries.

The Directorate liaises and monitors performance of exchange students who avail this opportunity. Efforts are in hand to establish similar collaborative MOUs with more institutes of repute.

We in HITEC University do not perceive quality assurance as an added one layer activity in our academic programs and services. We do believe and practice "quality assurance" as an integral attribute in all facets of our endeavors and activities

Admissions



Lt Col Muhammad Hafeez (Retd), TI (M)

MA Educational Administration
MA Political Science

Registrar

The Office of the Registrar is the nucleus of the University and coordinates all the activities within and outside the University. It is the custodian of the common seal and academic records of the University. It provides secretariat support to the Board of Governors and the Vice Chancellor. It maintains the register of students and its graduates. This Office is responsible for the admissions, registration, semester enrolments of the students and preparation of degrees for the graduating students. It also maintains record of students, faculty and staff of the University.

The admissions are strictly based on merit. The University is open to all persons without prejudice to gender, religion, race, creed, color or domicile.

Admission is granted on the basis of eligibility criteria. Applicants, who have appeared in a prerequisite examination prescribed for admission in a program and are awaiting results, will be provisionally admitted against an undertaking that they will pass their examination as per admission criteria.

Students awaiting results are required to submit attested copies of their certificates/degrees within two weeks after the declaration of results, failing which the University will cancel their admissions. Only those students will be registered who would complete all admission formalities including deposit of their fees and other dues on prescribed date.

Every undergraduate student shall be expected to take the full load of the courses prescribed for the semester. A master level student, however, will have the option to enroll for fewer courses.

Students applying for graduate programs are required to be qualified as per criteria laid down by HEC.



Eligibility Criteria

BS (Electrical Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry and Mathematics or
- Diploma of Associate Engineers with same/Relevant Technology/Disciplines approved by PEC
- Minimum 60 % marks.

BS (Mechanical Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry and Mathematics or
- Diploma of Associate Engineers with same/Relevant Technology/Disciplines approved by PEC
- Minimum 60 % marks.

BS (Computer Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry / Computer Science and Mathematics.
- Diploma of Associate Engineers with same/Relevant Technology/Disciplines approved by PEC
- Minimum 60 % marks.

BS (Civil Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry and Mathematics.
- Diploma of Associate Engineers with same/Relevant Technology/Disciplines approved by PEC
- Minimum 60 % marks.

BS (Bio-Medical Engineering)

- F Sc/A Level or equivalent with Biology / Mathematics, Chemistry and Physics
- Diploma of Associate Engineers with same/Relevant Technology/Disciplines approved by PEC
- Minimum 60 % marks.

BS (Computer Sciences / Software Engineering)

- F.Sc Pre-Engineering / Pre-Medical / ICS /A Level or equivalent
- Minimum 50 % marks.

BS (Mathematics)

- Intermediate / equivalent with Mathematics with minimum 50 % marks.
- Diploma of Associate Engineers with minimum 60% marks.

BS (Physics)

- Intermediate / equivalent with Physics and Mathematics with minimum 50 % marks.
- Diploma of Associate Engineers with Physics and Mathematics with minimum 60% marks.

BS (Islamic Studies)

- Intermediate / equivalent / Khassa Certificate recognized by HEC.
- Minimum 45 % marks.

BBA (Bachelors in Business Administration)

- Intermediate / equivalent with minimum 50 % marks

MS Engineering (Electrical / Mechanical / Computer)

- BE / BS / BSc Engineering in relevant discipline.
- Minimum CGPA 2.00/4.00 or 50% marks.
- GAT General conducted by NTS / University Admission Test with minimum 50% cumulative score.

MS (Computer Science)

- BS (Computer Science / Software Engineering), MCS / MSc Comp Sc.
- Minimum CGPA 2.00/4.00 or 50% marks.
- GAT General conducted by NTS/University Admission Test with minimum 50% cumulative score.

MS (Mathematics)

- BS/M.Sc Mathematics.
- Minimum CGPA 2.00/4.00 or 50% marks.
- GAT General conducted by NTS / University Admission Test with minimum 50% cumulative score.

MS (Islamic Studies)

- MA/BS (Islamic Studies / Shariah / Arabic).
- Dars-e-Nizami from HEC recognized institution with 50% marks.
- Minimum CGPA 2.00/4.00 or 50% marks.
- GAT General conducted by NTS / University Admission Test with minimum 50% cumulative score.

PhD

- MS / M Phil or equivalent (in relevant discipline) with minimum CGPA 3.00/4.00 from an HEC recognized institution.
- GAT Subject test conducted by NTS with minimum 60% cumulative score or GRE Subject test with minimum 60% percentile score.

Admission Test

A written Admission Test is compulsory for all admissions in undergraduate programs as advertised in the national press. NAT-IE / IM / ICS / IGS / ICOM / IA / HAT / ECAT result conducted by NTS, HEC and UETs are also eligible to apply.

Admission Test will be held at the prescribed date comprising following pattern:

Engineering

| | |
|---|-----|
| English | 22% |
| Analytical | 22% |
| Quantitative (Arithmetic, Algebra & Geometry) | 22% |
| Subject (Physics, Mathematics, & Chemistry) | 34% |

Computer Science

| | |
|---|-----|
| English | 22% |
| Analytical | 22% |
| Quantitative (Arithmetic, Algebra & Geometry) | 22% |
| Subject (Physics, Computer, & Mathematics) | 34% |

Bio-Medical Engineering

| | |
|---|-----|
| English | 22% |
| Analytical | 22% |
| Quantitative (Arithmetic, Algebra & Geometry) | 22% |

Subject (Physics, Computer, & Mathematics) 34%

Mathematics

English 22%

Analytical 22%

Quantitative (Arithmetic, Algebra & Geometry) 22%

Subject (Physics, Mathematics, & Chemistry) 34%

OR

Subject (Mathematics, Statistics & Economics) 34%

BBA

English 22%

Analytical 22%

Quantitative (Arithmetic, Algebra & Geometry) 22%

Subject (Physics, Mathematics, & Chemistry) 34%

Determination of Merit

The final merit will be determined based on:-

University Admission Test 30%

HSSC Part 1/HSSC or equivalent 50%

SSC / O-level 20%

Merit list of candidates who have appeared in A level (Final Exams) will be prepared by assigning 50% weightage to O-Level marks and 50% weightage to the admission test. Final selection will be based on securing minimum 60% marks in A Level as per equivalence provided by Inter





Board Committee of Chairmen.

Announcement of Result

The result will be announced as per given schedule. Complete result will be displayed on the University website. All selected candidates will be informed about their admissions through the Email and SMSs. List of selected candidates will also be displayed at the University Secretariat.

Late Admissions

As a matter of policy, late admissions are not entertained and no deviation is made from the announced schedule. The University reserves the right to reject the application of a student for admission without assigning any reason.

Registration and Enrollment

- On completion of admission formalities including deposit of dues, the applicants will be registered as bonafide students of the University.
- Applicants are required to provide original academic certificates and documents to the Registrar Office at the time of registration.

- After registration, Registrar Office will issue University Registration Card/Identity Card to all students.
- Students are allowed to enroll for the courses offered by their department after getting their Registration Number.
- If a student fails to get himself enrolled for the courses his/her name will be struck off the strength and vacant position will be offered to the next candidate on the waiting list.
- Students must enroll for the courses in each semester within first two weeks of the start of the semester.
- All admissions will be provisional until provision of original documents.

Transfer within HITEC University

We do not encourage shifting students from one discipline to the other. However in extreme circumstances, students can be transferred from one discipline to the other within the same merit or to the discipline with lower merit on their request.



Dates to Remember

| Events | Date | Days |
|---|-------------------------|----------|
| Availability of Prospectus | 15 June 2020 | Monday |
| Last Date of Submission of Admission Form | 21 July 2020 | Tuesday |
| Admission Test | | |
| First Merit List | 30 July 2020 | Thursday |
| Deposit of Dues /Registration of Students | 30 July - 6 August 2020 | Thursday |
| 2nd Merit List | 7 August 2020 | Friday |
| Deposit of Dues /Registration of Students | 7-17 August 2020 | Monday |
| Third Merit List (If required) | 18 August 2020 | Tuesday |
| Commencement of Fall Semester 2020 | 14 September 2020 | Monday |
| Orientation | 14 September 2020 | Monday |

Contacts

**Muhammad Hafeez, TI (M)
Registrar**

Office: 051-4908143
Email: registrar@hitecuni.edu.pk

**Farrukh Shahzad
Deputy Registrar**

Office: 051-4908146-49, Ext 364
Email: deputy.registrar@hitecuni.edu.pk



Financial Matters



Ms. Afsheen Zahoor

Treasurer

Treasurer is the Chief Financial Officer of the University. This office is vested with the responsibility to maintain and prepare the accounts of the University in accordance with the generally accepted accounting standards approved in Pakistan. The management of University assets, liabilities, receipts, expenditures, funds and investments are also at the discretion of this office. The Treasurer office also ensures utilization of funds according to the budget approved by the Board and perform such functions as assigned by Board of Governors of the University.

Fee Structure

The fee structure for the students registered in the academic year 2020-21 in different disciplines of undergraduate & postgraduate is as under

| Programs | Admission/Registration Fee (One Time) Non Refundable in all cases | Security Deposit (One Time) Refundable | Semester Fee* |
|----------------------|---|--|-----------------------|
| BS Engineering | Rs. 30,000/- | Rs. 20,000/- | Rs. 110,000/- |
| BS Computer Sciences | Rs. 30,000/- | Rs. 20,000/- | Rs. 81,000/- |
| BS Mathematics | Rs. 20,000/- | Rs. 15,000/- | Rs. 50,000/- |
| BS Physics | Rs. 20,000/- | Rs. 15,000/- | Rs. 50,000/- |
| BS English | Rs. 20,000/- | Rs. 15,000/- | Rs. 42,000/- |
| BBA | Rs. 20,000/- | Rs. 15,000/- | Rs. 75,000/- |
| BS Islamic Studies | Rs. 20,000/- | Rs. 15,000/- | Rs. 30,000/- |
| MS Engineering | Rs. 20,000/- | Rs. 15,000/- | Rs. 6,500/- per cr hr |
| MS Mathematics | Rs. 20,000/- | Rs. 15,000/- | Rs. 6,500/- per cr hr |
| MS Computer Sciences | Rs. 20,000/- | Rs. 15,000/- | Rs. 6,500/- per cr hr |
| MS Islamic Studies | Rs. 20,000/- | Rs. 15,000/- | Rs. 4,000/- per cr hr |
| PhD | Rs. 20,000/- | Rs. 15,000/- | Rs. 6,500/- per cr hr |
| Thesis Fee | | | Rs. 20,000/- |

Note: Tax will be applicable on the Fees as per Government Rules. Taxable Fee as per Section 236(I) of the Income Tax Ordinance 2001 includes Semester Fee and all charges received by the educational institutions, by whatever name called, excluding the amount which is refundable. It also includes hostel and transport charges. Semester fee includes tuition fee, examination fee, lab charges and sports subscription etc.

Payment of Dues

1. The registered students must deposit their semester fee in the HITEC University's Fee Collection Bank Alfalah Ltd / Askari Bank Ltd mentioned on the fee challan.
2. The University Fee Challan will be downloaded by the students by logging into MIS user ID.
3. All registered students of the University should deposit their semester fee in advance on due date before commencement of classes of that semester, thereafter, fine/penalty will be charged as per University policy.
4. At the time of admission students have to pay the admission & registration fee, security deposit and full semester fee in advance. Candidates can deposit the fee online, after taking print of Fee Challan, in Bank Alfalah Ltd or Askari Bank Ltd mentioned on the Fee Challan.
5. All students have to pay their Full Semester Fee and allied charges in advance before the commencement of semester.
6. Submission of "Online Fee Deposit Challan" to accounts office HITEC University is the responsibility of the student in order to register in the semester.

Refund Policy

The candidate /student who applies for cancellation of admission will be refunded tuition fee according to the HEC Policy letter No. 10-1/HEC/A&C/2012/94 dated 11th September, 2012.

| Undergraduate Program | |
|---|------------------------|
| Timeline | % age of Tuition Fee |
| Up to 7 th day of commencement of Classes | Full (100%) Fee Refund |
| From 8 th - 15 th day of commencement of Classes | Half (50%) Fee Refund |
| From 16 th day of commencement of Classes | No Fee (0%) Fee Refund |
| Postgraduate Program | |
| Timeline | % age of Tuition Fee |
| Up to 14 th day after Commencement of Classes | Full (100%) Fee Refund |
| After 14 th Day of Commencement of Classes | No (0%) Fee Refund |
| <ul style="list-style-type: none"> • %age of Tuition Fee shall be applicable on semester tuition fee only. Admission Fee is not refundable. • Timeline shall be calculated continuously, covering both weekdays and weekends • Fee refund is applicable only for those candidates who deposit full fee charges i.e. tuition fee, admission fee and security deposit. | |
| <ul style="list-style-type: none"> • University will not accept any claim of refund after 3 years of the completion of degree / withdrawn from University and the amount of security deposit will be transferred to the <u>HITEC University Development Fund.</u> | |

Fines/Penalties on Late Payments

The following fine will be levied for payment of fee after due date:

| | |
|---|---------------------------------------|
| After the due date till first ten days from the start of semester | Fine @ 5% of the total payable amount |
| After 10 th day from the start of semester till 20 th day | Fine @ 10% of total payable amount |
| On 21 st day from the start of semester | Registration shall be suspended |

- For re-activation/restoring of registration of the student by the department within first four weeks of the semester, the student will be required to pay Rs. 5,000/- as reinstatement fee along with all outstanding charges and fines.
- On the 1st day of the fifth week of the semester, the enrollment will be closed and the student who fails to deposit fee and has not been restored, will not be allowed to continue his/her studies in the semester.
- In any case the student will not be able to attend classes till clearance of dues.
- Timeline shall be calculated continuously, covering both weekdays and weekends

Financial Assistance & Scholarship

The HITEC University allocates substantial amount of scholarship and financial assistance to the deserving students as per policy given below:

| Financial Assistance & Scholarship Categories | Criteria |
|--|---|
| 1 st Semester Merit List Positions | 50% tuition fee waiver for 1 st semester only |
| China North Industries Corporation NORINCO Scholarship | Awarded to position holders of each discipline per semester. Minimum GPA requirement is 3.5 |
| Financial Need Cum Merit Basis | Awarded to eligible candidates as per policy, subject to a minimum of 2.5 GPA |
| Muhammad Nusrat Scholarship | Awarded to eligible deserving candidates as per policy |
| Begum Razia Sultana Scholarship | Awarded to eligible deserving candidates as per policy |
| Thinker's Forum Pakistan Scholarship | Awarded on performance basis to deserving students |
| Qarz -e-Hasna Scheme | Available to eligible candidates in collaboration with "Ihsan Trust" of Meezan Bank Ltd |
| Top 25 Board Position Holders | 100% tuition fee waiver provided the student maintains minimum GPA of 3.5 in each semester. |

Accommodation

On-campus accommodation is available (for boys) on **first come first served** basis. Accommodation charges are per semester to be deposited before the start of semester.

| | |
|------------------------------|--------------|
| Hostel Security (Refundable) | Rs. 15,000/- |
| Hostel Charges Per Semester | Rs. 40,000/- |

The candidate / student who applies for cancellation of hostel accommodation will be refunded according to Refund policy of UG and PG programs. Timeline shall be calculated continuously, covering both weekdays and weekends

Transport

Transport facility is available for Islamabad & Rawalpindi areas only on **first come first served** basis. Transport charges are per semester to be deposited before the start of semester.

| | |
|--------------------------------|--------------|
| Transport Charges Per Semester | Rs. 25,000/- |
|--------------------------------|--------------|

The candidate / student who applies for cancellation of transportation facility will be refunded according to Refund policy of UG and PG programs. Timeline shall be calculated continuously, covering both weekdays and weekends

Miscellaneous Charges

| Description | Amount / Rates |
|---|---|
| Course Repeat Fee/Additional Course/Summer Semester Fee | Rs. 6,500/- per credit hour |
| Semester Freeze Fee | 25% of the each semester Fee (UG) Rs. 10,000/- per semester (PG) |
| Migration Fee | Rs. 25,000/- each exempted semester |
| Transcript Fee/ Semester | Rs. 500/- Normal (7 days) & Rs. 1,500/- Urgent (3 days) |
| Degree Fee (Before Convocation) | Rs. 3,000/- Normal (7days)& Urgent Rs. 5,000/- (3 days) |
| Additional Grade Report Including Attestation | Rs. 300/- per semester |
| Recalculation Fee | Rs. 1,000/- per subject |
| Attestation | Rs. 100 per document |
| Duplicate Admit Card | Rs. 200/- |
| Verification Fee | Rs.1,500/- Local , Rs.5,000/- Overseas |
| Convocation Charges | Rs. 10,000/- (will be deducted from the security deposit) |

* University will not accept any claim of refund after 3 years of the completion of degree / withdrawn from University and the amount of Convocation Charges will be transferred to the **HITEC University Development Fund.**

Contacts

Ms. Afsheen Zahoor
Treasurer
Tel: 051-4908146-49 Ext. 305
Email: treasurer@hitecuni.edu.pk

Mr. Haris Imtiaz Hanfi
Deputy Treasurer
Tel: 051-4908146-49 Ext. 367
Email: deputy.treasurer@hitecuni.edu.pk

Academic Regulations (Common to all)



Engineer Iftikhar Rehman
Controller of Examinations

The Office of the Controller of Examinations is responsible for all the examination matters and ensures that the examinations are held in free and fair environment. It is also responsible to notify the date sheet, appoint the supervisory staff and issue admit cards to the students in end semester examination. The Office maintains strict secrecy of all information regarding examination matters, notifies the semester and other results. Assist the IT Department to prepare semester grade reports available to students on University website. The Office also maintains entire examination records of the students, issues interim/final transcript(s) and other certificates.

The HITEC University Taxila follows semester system, quite akin to that in vogue in American universities. Singular features of this system are highly focused well delivered classroom lectures, extensive experimentation and continuous assessment of students' performance. It aims to infuse habits of regularity and competitiveness amongst the students.

Definition of various terms applicable to our system and a summary of regulations are given below. Please do take few minutes to peruse through them.

Academic Calendar

It consists of two regular and a Summer Semester. Duration of regular semesters is nineteen weeks each which includes sixteen weeks of teaching and three weeks of examinations. The Summer Semester (conducted for undergraduate programs only) is condensed to eight weeks duration, but the credit hours taught for a course are equal to a regular semester. The schedule of semesters for the year 2020-2021 is:-

| | |
|----------------------|---------------------------------------|
| Fall Semester 2020 | September 07, 2020 - January 15, 2021 |
| Spring Semester 2021 | February 01, 2021 - June 11, 2021 |
| Summer Semester 2021 | June 14, 2021 - August 20, 2021 |

Contact Hour

One hour including ten minutes break spent on academic and research related activities including instructional work/tutorials, laboratory work (practical), research work, projects, seminars, workshops, internships, etc during the course of studies at the University.

Credit Course

A course of which enrolment and successful completion is a mandatory requirement for the award of degree.

Credit Hour (Cr Hr)

A lecture of one hour duration (including ten minutes break) delivered per week per semester for a course countable towards a student's Cumulative Grade Point Average. However, in case of seminars, tutorials and laboratory work (practical), one credit hour may require two or three contact hours depending upon the nature of the subject.

Grading System

The performance of each student in a course of study is based on relative grading system except otherwise mentioned. The grades and grade points in case of relative grading are as follows:-

| GRADE | GRADE POINT |
|-------|-------------|
| A | 4.00 |
| A- | 3.67 |
| B+ | 3.33 |
| B | 3.00 |
| B- | 2.67 |
| C+ | 2.33 |
| *C | 2.00* |
| C- | 1.67 |
| D | 1.00 |
| F | 0.00 |
| I | Incomplete |

(* Lowest grade in case of Graduate Programs)

Note: In all cases of project, thesis, dissertation evaluation and where the class strength is 10 or less students, the performance will be based on the marks obtained by a student and the grades and grade points will be as follows:-

| MARKS | GRADE | GRADE POINTS |
|--------------|-------|--------------|
| 90-100 | A | 4.00 |
| 85-89 | A- | 3.67 |
| 80-84 | B+ | 3.33 |
| 75-79 | B | 3.00 |
| 70-74 | B- | 2.67 |
| 65-69 | C+ | 2.33 |
| 60-64 | *C | 2.00* |
| 55-59 | C- | 1.67 |
| 50-54 | D | 1.00 |
| less than 50 | F | 0.00 |
| - | I | Incomplete |

(*Lowest grade in case of Graduate Programs)

Award of Grade 'F'

In addition to 'F' grade awarded on the basis of academic failure, a student shall not be allowed to appear in end semester examination of a subject in which his/her attendance is less than 75%, and he/she shall be awarded 'F' grade in that subject. The 'F' grade so obtained shall only be cleared by repeating the same course whenever offered.

Award of Grade 'I'

A student, who, because of illness or other acceptable reason(s) approved by the Departmental Board of Studies/ Board of Faculty, fails to appear in end semester examination, provided his/her overall attendance is not less than 75%, is given 'I' as a grade. The student receiving such a grade makes up the unfinished portion of his course and is given a grade at the discretion of the faculty without prejudice to the previous grade 'I'. In case the student fails to make up the course work, he/she receives a grade 'F' unless further extension is given by the Board of Faculty. He/she shall pay the prescribed fee for re-appearing in the end semester paper. Following procedure should be adopted to remove 'I' grade:-

- Sessional Examinations.** Whenever a student misses sessional examination due to reasons acceptable to Departmental Board of Studies, make up test shall be arranged within the period to be decided by the Departmental Board of Studies but not later than four weeks from original date of missed sessional examination. Makeup test for Mid-term examination of two hours duration (only for lab courses) will also be governed accordingly.
- End Semester Examination.** Whenever a student misses end semester examination due to reasons acceptable to the Departmental Board of Studies, make up examination shall be arranged within first six weeks after the beginning of the subsequent semester.

Attendance Rule

A student shall not be allowed to appear in end semester examination of a subject in which his/her attendance is less than 75%, and he/she shall be awarded 'F' grade.

Cumulative Grade Point Average (CGPA)

The summation of grade points of all credit courses divided by the total number of credit hours taken by a student, i.e.

$$\text{CGPA} = \frac{\text{Sum of (P} \times \text{N)}}{\text{Sum of N}}$$

Where 'P' represents grade point assigned to a letter grade scored by the student in a course and N represents the number of credit hours associated with the course. In short it is the ratio of total grade points earned in all the courses to the total number of credit hours of those courses.

Semester Grade Point Average (GPA)

The summation of grade points of the particular semester credit courses divided by the total number of credit hours taken by a student in that semester, i.e.

$$\text{GPA} = \frac{\text{Sum of (P} \times \text{N) of a semester}}{\text{Sum of 'N' of that semester}}$$

where 'P' represents grade point assigned to a letter grade scored by the student in a course and N represents the number of credit hours associated with that course. Here numerator is the summation of grade points earned in a semester and denominator is the summation of credit hours attended in that semester.

Repetition of Course(s)

A student can repeat a course to obtain minimum CGPA laid down for the prescribed program or to improve the CGPA. It is the responsibility of the student to clear the failed course(s) or improve CGPA by applying (subject to course offering) to the respective chairperson and get the

approval to repeat the course. While repeating a course, a student will undergo all the formalities applicable to regular semester i.e. pay the fee, attend the classes and appear in the quizzes, assignments, projects, practical examination, sessional examinations and end semester examination as planned for the course. During Summer Semester a maximum of 'B' grade shall be awarded.

Opting to repeat a course(s) a student shall not be eligible for top honors/awards even if he/she improves and obtains equal or better CGPA. The student transcript shall show both old and new earned grades, but the CGPA shall be based on better earned grade. Apart from clearance of 'F' grade an undergraduate student can repeat a maximum of six courses and graduate student can repeat a maximum of two courses.

Semester Freeze

Based on the positive recommendation of the Chairperson of the Department/ College/ Institution; semester freeze up to one year from course work is allowed to students facing acute domestic problems or on other valid reason(s). During semester freeze period an undergraduate and a graduate student shall pay the laid down fee to continue his/her registration with the University. Prior to resumption of studies after the semester freeze, it shall be mandatory to clear all the previous outstanding dues, if any. Freezing of first semester is not allowed.



Final Grade

The grade earned by a student in home assignments, quizzes, case studies, viva voce, practical/laboratory work, sessional examinations, end semester examination and projects etc, are formalized into final result by the concerned faculty member. All the examination answer books/sheets including end semester examination are marked and shown to the students. The marks obtained by the student in each examination are also displayed on notice boards at least one week prior to commencement of end semester examinations. The faculty members prepare the final results of the students on the award list in duplicate and submit it to the Departmental Board of Studies. The award list of each course duly approved by the Departmental Board of Studies is then sent to the Office of the Controller of Examinations.

Recalculation/Change of Grade

There shall be no re-evaluation of answer scripts of the end semester examination. However, a candidate shall be allowed to have his/her answer scripts rechecked by the Controller of Examinations on payment of prescribed fee within 30 days of the declaration of the result. The Dean of the Faculty concerned, on the recommendation of the concerned Chairperson, may condone the delay up to a maximum period of 15 days on payment of double fee. The Controller of Examinations and a faculty member of the concerned department shall check the answer scripts of the end semester examination of the applicant and satisfy themselves regarding following aspects and certify that:-

- The script belongs to the applicant and that it has not been changed.
- No portion of the script has been left unmarked.
- The marks awarded in the script have been correctly brought out/ reproduced on its cover.
- The grand total on the cover of the script is correct.
- The grand total on the cover of the script is correctly transferred to the award list.
- The result has been correctly posted and notified.

Change in Pre-End Semester Examination Result(s)

After notification/declaration of final results by the Controller of Examinations, pre-end semester examination results will not be changed e.g. quizzes, assignments, sessional examinations or any other activity which was assigned marks. Only the application(s) raising query in final paper will be accepted. Student(s) seeking change/rectification of pre-end semester examination results due to erroneous entry of marks by the concerned faculty member will be admitted and processed through Chairperson of concerned Departments/Institutes/ Colleges.

Medium of Instruction

The medium of instruction will be English except where permitted by the competent authority.

Semester Enrolment

Enrolment in each regular and Summer Semester is mandatory for every student. List of enrolled students will be notified by the Registrar Office within first two weeks of commencement of each semester and Controller of Examinations shall publish results on the basis of that list. Enrolment forms are available with each Department and if a student fails to enroll for the semester, his/her name will be struck off the university rolls and will be included in the list of suspended students. The registration will be restored after paying the laid down fee and the fine imposed as per rules.

Course Add/Drop

Undergraduate Programs. A student, if allowed to enroll in additional course(s) in a regular semester or during Summer Semester, can add or drop a course(s) on the basis of conflict in weekly program or on personal grounds within first two weeks of commencement of semester. In this case fee will not be charged, nor will the result be announced. In all other situations a student is liable to pay the fee and his/her result will also be announced.

Graduate Programs. A student can apply and get approval by the respective Chairperson of department/school/institution, to add or drop course(s) due to conflict in weekly program or on personal grounds within first two weeks of commencement of regular semester. In this case fee will not be charged, nor will the result be announced. In case a student applies for dropping a course(s) within two weeks after first sessional examination, fee will be charged, but the result will not be announced. In all other situations a student is liable to pay the fee and his/her result will also be announced.

Semester Credit Load

In every semester, undergraduate students must enroll in all the courses prescribed for that semester (as specified in the road map of the Program). The academic load in each semester ranges from fifteen to eighteen credit hours for undergraduate, maximum twelve credit hours for MS and nine credit hours for PhD Programs. In Summer Semester, an undergraduate student can enroll in the number of courses not exceeding nine credit hours.

Academic Performance Evaluation

The students are evaluated as per following criteria:-

- Quizzes
- Home Assignments
- Case Studies/Seminars/Workshops
- Practical/Laboratory Tests
- Project
- Internship
- Viva Voce
- Sessional Examinations
- End Semester Examination

UNDERGRADUATE PROGRAMS Academic Deficiencies

Conditions

A student who obtains one or more of the following grades in a regular semester final result is considered academically deficient, namely:-

- 'F' grade in any subject.
- First Semester GPA is less than 2.00.
- CGPA less than 2.00.
- 'I' (Incomplete) grade in any course.

The Academic Deficiencies are:-

- **Probation.** Probation means that a student is deficient in academic standards and is either likely to be withdrawn from the program.
- **Relegation.** Relegation means that the student is asked to join the next junior class when recommended by the Board of Faculty. It can be on at own request, medical or disciplinary grounds.
- **Withdrawal.** Withdrawal means that a student is considered unsuitable for further studies and shall be deregistered from University rolls.

Disposal of Academically Deficient Students

Probation

A student is placed on academic probation if:-

- CGPA is below 2.00 and this clause will not be applicable in first semester.

Relegation

A student is relegated under any of the following conditions:-

- On medical or disciplinary grounds
- Own request

GRADUATE PROGRAMS

Masters' Program(s)

Academic Deficiencies

A student shall be dropped from the Masters' program if a student:-

- Fails in more than one course in course work
- Fails to clear the F grade
- CGPA remains below 2.50 after completion of course work even after availing repetition of courses allowed under the rules
- CGPA less than 2.50
- 'I' (Incomplete) grade in any course.

Disposal of Academically Deficient Students

The cases are disposed off by the Board of Faculty on the recommendation of Departmental Board of Studies. The Board may award one of the following:-

- Probation
- Withdrawal

Probation

- **Definition.** Probation means that a student is deficient in academic standards and is likely to be withdrawn from the program.
- **Policy.** Board of Faculty shall recommend and place a student on academic probation under any of the following conditions if the:-
 - CGPA is equal to 2.00 or above and less than 2.50 at the end of a semester
 - Student fails in a subject.

Withdrawal

- **Definition.** "Withdrawal" means that a student is considered unsuitable for further studies and shall be struck off the University rolls.

Withdrawal

A student is withdrawn from the University subject to any of the conditions listed below:-

- Fails to achieve CGPA of 2.00 or does not clear "F" grade on completion of 7 years of education from the date of registration.
- Fails in all the courses in first semester.
- Earns five probations.
- On disciplinary grounds when recommended by the respective Discipline Committee and approved by the VC.

Duration

Minimum period for completion of undergraduate program(s) is four years and maximum period shall be seven years.

Award of Degree

HITEC University, awards undergraduate degree to the students who satisfy the following conditions:-

- Have completed the minimum credit hours as per approval of PEC/HEC for each program
- Have achieved a minimum CGPA of 2.00
- Have no unclear 'F' grade and
- Have cleared all dues





- **Policy.** Board of Faculty shall recommend and place a student on academic probation under any of the following conditions if the:-
 - First semester GPA is below 2.00
 - Fails more than once in course work
 - CGPA remains below 2.50 after completion of the course work even after availing the chances allowed under the provision of regulation "Repetition of Course".

Transfer of Credits

Course credits may be transferred from other local accredited or foreign HEC recognized institution(s), if they are relevant and appropriate to a Master's program in a discipline approved by the University. Following shall be applicable:-

- Only the course(s) with 'B' grade, equivalent or higher shall be considered for transfer
- The candidate will have to complete the program in the stipulated time as laid down by the HEC/ University, and it shall include the time already spent in the previous institution
- A maximum of 12 Cr Hrs earned in the previous

institution can be transferred to HITEC University; and

- The transfer of credits is subject to acceptance by the concerned Departmental Board of Studies.
- Admission by migration shall not be allowed after expiry of three weeks of commencement of classes/ semester.
- Migration shall not be allowed from affiliated colleges or institutes.
- The student should be passing in all the subjects and achieved a minimum CGPA of 3.00 out of 4.00.

Improvement of CGPA

Before opting for thesis work or two additional courses in lieu for MS thesis work, a student may repeat only two courses having grade point of less than 3.00. Procedure for repeating the course(s) shall be as under:-

- The candidate shall apply to the Chairperson for permission to repeat the course.
- The student shall have to pay the prescribed tuition fee for the repeated course. The transcript shall show both the old grade and the new earned grade but the CGPA shall be based on the better grade.

- The student shall have to repeat the course within the time limit given by the supervisor.
- In addition to clearance of the 'F' grade, a student shall be allowed to repeat a maximum of two courses only during his/her entire coursework.
- Course replacement will only be allowed in case the same is not being offered and time to complete the program is short.

Duration

Minimum period for completion of MS program shall be one and a half years and maximum period shall be four years.

Appointment of Supervisor

On the written request of the student, the Chairperson with the approval of the concerned Dean of faculty will send the case for formal notification.

Change of Supervisor

Under special circumstances, a student can request change of MS supervisor. It will be allowed by the Chairperson in consultation with the concerned Dean and approval of the Vice Chancellor.

Co-Supervisor / Co-Advisor

If required, a PhD qualified faculty / specialist from industry or an R&D organization (in a specific field in which requisite expertise/facilities are not available within the university) may be appointed. The co-supervisor/co-advisor shall assist in supervision/guidance of thesis of MS student till completion of research work. The co-supervisor/co-advisor must have sufficient experience and relevant qualification in the field of research.

Appointment of External Examiner

- Will be nominated from the list of local external examiners as suggested from time to time by the Departmental Board of Studies and approved by the Board of Faculty.
- The supervisor shall suggest a panel of at least three

external local examiners in order of priority from the approved list. The Dean shall appoint one external local examiner from the suggested panel to evaluate the Thesis.

Submission of Thesis

The candidate shall be eligible to submit the thesis, provided the course work formalities have been completed. The thesis should be written in English language except where recommended by the Chairpersons and allowed by the VC.

Research during Master Program

The procedure for thesis research shall be as under:

- All students must successfully complete a minimum of 6 credit hours in Master's thesis.
- Subject of research shall be agreed to by the student and the research Supervisor/Advisor (thesis advisor). The research must not be plagiarized.
- Thesis shall be graded and will be counted towards calculation of CGPA for all programs.
- Change in the area of research, once it has been finalized, will be discouraged. However, if it becomes inevitable, then the matter will be discussed in Departmental Board of Studies. After detailed deliberations, the Board will forward its recommendations to the Dean for approval.

Evaluation of Thesis

- The Thesis will be sent for evaluation to one local (external) expert.
- Final presentation of Thesis will be given after obtaining positive evaluation report by the local (external) expert.
- The expert shall submit his/her report to the Controller of Examinations.
- In case, the expert asks for a resubmission, the candidate will be asked to work on the Thesis for a maximum period of six months before submitting it for

re-evaluation.

- The Thesis shall be resubmitted after incorporating revisions and suggested changes.
- First resubmission may be allowed at least three months after intimation to the concerned supervisor.
- Third resubmission is not allowed and the candidate shall be declared fail.
- Chairperson of the concerned department will be responsible to arrange the open defence of the Thesis.

Change of External Expert

- In case, the expert fails to respond within two weeks, a new expert shall be recommended to the Dean.
- In case, the second expert does not respond within two weeks, a new panel of two experts shall be recommended to the Dean.

Submission of Final Thesis

The thesis submitted by Masters 'candidate shall comply with the following conditions:-

- This thesis should exhibit literature research, application of well proven knowledge and its simulation or practical implementation in creating a solution.
- It shall not include research work for which a degree has already been conferred in this or any other university.
- Initially, the candidate shall submit two spiral bound copies of completed thesis along with an application on prescribed form, duly recommended by the Supervisor and the Chairman of the Department to the Controller of Examinations for evaluation.
- At final submission four hard bound copies of Thesis having a soft copy on CD, will be prepared for submitting of one copy to the University, one copy for the Department, one copy for the Supervisor and one copy for the student.

Award of Degree

The University, on recommendations of Board of Faculty,



shall award Masters' degree to the students who satisfy the following conditions:-

- **Course Work.** The minimum course work required shall be 24 credit hours or as approved by HEC for each program of masters' degree.
- **Research Work.** In addition to the course work, all students should either enroll for 6 Cr Hrs of research thesis or two additional courses of 3 Cr Hrs each to complete the program.
- **Successful Thesis Defence.** After completing the thesis the open defence will be held and student will defend his/her thesis.
- The Vice Chancellor may approve the recommendations of the Board of Faculty on behalf of the Board of Governors regarding the award of Masters' degree to the candidate(s).
- **Other Conditions.** Should have:-
 - Achieved a minimum CGPA of 2.50.
 - No unclear 'F' grade(s)
 - Cleared all dues.

Fee and Other Dues

Each student shall be required to pay tuition fee and such other charges as may be prescribed from time to time.

Plagiarism Test

Plagiarism test must be conducted on the thesis before its submission to external expert or as applicable by the QAC.

PhD Program(s)

Academic Deficiencies

A student shall be dropped from the PhD degree program if the student:-

- Receives 'F' grade in more than one course.
- Fails to clear the F grade after repeating the course.
- On completion of course work and even after availing the chances for improvement of grades, the CGPA remains below 3.00
- Fails twice in the comprehensive examination.
- On disciplinary grounds when recommended by the Discipline Committee.
- Other conditions are also applicable as mentioned in the academic regulations of this University.
- Fails to pass comprehensive examinations within first two years after admissions.

Improvement of CGPA

Before taking the comprehensive examination, a student may repeat only two courses having grade point average of less than 3.00.

Procedure for repeating the course(s) shall be as under:-

- The candidate shall apply to the Chairperson for permission to repeat a course. The Chairperson, in consultation with the Supervisor, may permit the

student to repeat the course, subject to its offering.

- The transcript shall show both the old and the new earned grades but the CGPA shall be based on the better grade.
- The student shall have to repeat the course within the time limit given by the supervisor.
- In addition to clearance of the 'F' grade, a student shall be allowed to repeat a maximum of two courses only during his/her entire PhD coursework.

Confirmation of Admission

- After successful completion of graduate level courses or equivalent (minimum 18 credit hours) with a minimum CGPA of 3.00 out of 4.00, a student shall take a comprehensive examination consisting of written and oral components.
- The comprehensive examination should be conducted as soon as possible after the completion of course. The pass percentage shall be 60%.
- A Department shall normally hold at least one comprehensive examination in an academic year which shall be conducted by the PhD Examination Committee approved by the VC on the recommendations of the Chairperson of the Department and Dean of the Faculty concerned in consultation with the Supervisor.
- The Supervisor of the student will be the Chairman of this Committee.
- A maximum of two chances will be available for clearing the comprehensive examination.
- The registration of a PhD student shall be cancelled if he/she does not pass the comprehensive examination even in the second attempt.
- Within one year of passing the comprehensive examination, the student with the guidance of supervisor will submit a synopsis of the proposed research topic for the approval of Board of Advanced Studies and Research.

- On approval of synopsis of the proposed research topic by Board of Advanced Studies and Research, the admission of the candidate to PhD program will be confirmed.
- Failure to present the research proposal within the specified time may result in cancellation of admission of the candidate.

Appointment of Supervisor

Board of Advanced Studies and Research will appoint a supervisor from the relevant field as proposed and approve the field of research/title on the recommendation of the Department concerned.

Appointment of Guidance and Evaluation Committee

A doctoral GEC shall be formed at the earliest after the acceptance of an applicant into PhD Program, within a month after the appointment of supervisor. The Chairperson in consultation with the student and his supervisor and also with the approval of Dean shall appoint the Committee. The student's supervisor shall chair the Committee. GEC shall comprise of minimum three PhD members including the supervisor, one member from the department and one external member from a reputed national university or research organization/relevant industry. One additional member (if required) can be from other department of the HITEC University keeping in view the research topic and expertise of the faculty.

Proposal Defence

There shall be a proposal defense of PhD scholar before the GEC within 6 months after passing the Comprehensive Examination.

Appointment of a Co-Supervisor

A co-supervisor, if required, will be appointed with the mutual consent of student, supervisor, Department Chairperson and Dean. A co-supervisor should be a PhD, and shall be either from another department within HITEC University or outside the university/research organization.

Medium of Instructions

The medium of instructions, writing and examination shall be English unless otherwise approved by the VC.

Progress Reports

- The Supervisor of a PhD student shall submit a detailed report to the BAS&R by 30th June and 31st December each year on the progress of the student.
- In the absence of Supervisor, progress report will be submitted by the Chairman of the Department concerned.
- In case of two consecutive unsatisfactory reports by the Supervisor, the case will be recommended to BAS&R for cancellation of admission.

Change of Supervisor/Topic

- Any subsequent changes in the proposal will be forwarded to BAS&R through concerned Department and Dean.
- Request for change in PhD supervisor or if a supervisor opts to withdraw from supervision of a candidate will be sent to BAS&R for approval, through the Chairperson of concerned department.
- No relaxation in the completion time will be granted on this basis.
- The request for change of supervisor and topic is allowed once during entire PhD coursework.

Duration

- Minimum period for completion of PhD program shall be three years whereas the maximum period shall be eight years and shall include two years of residency.
- During residency, the University staff(s) selected to undergo the PhD program shall temporarily discontinue teaching (for residency period only) and will be paid scholarship/stipend as applicable/authorized from time to time.



Research Publication

Publication of at least one research paper based on PhD research work in an HEC approved “W” or “X” category Journal is essential for the award of PhD Degree in Science disciplines, while for Social Sciences paper published in Y category journal is acceptable besides W and X category of Journals.

Appointment of External Examiners

- Standing list of local external and foreign examiners suggested from time to time by the Departmental Board of Studies/Board of Faculty concerned and approved by the Board of Advanced Studies and Research will be maintained by each Department.
- The Supervisor shall suggest a panel of at least eight external examiners (four local and four foreign experts) from the approved list.
- The VC in consultation with Dean shall appoint two external and two local examiners from the suggested panel to evaluate the dissertation.
- Dissertation must be evaluated by at least two experts from technologically advanced countries and two local experts.

Plagiarism Test

Plagiarism Test must be conducted on the dissertation before its submission to foreign and local experts by the QAC.

Evaluation of Research Dissertation

- The dissertation will be sent for evaluation to two experts from technologically/academically advanced foreign countries and two local experts (external).
- Final presentation of dissertation will be given after obtaining unanimous positive evaluation report by all the four experts.
- Each expert shall submit his/her report to the Controller of Examinations.
- In case of rejection by one of the expert, the dissertation will be sent to the expert from the originally proposed panel for obtaining the final opinion.
- In case, if two of the experts ask for a resubmission, the candidate will be asked to work on the dissertation for a maximum period of six months before submitting it for re-evaluation.
- The dissertation shall be resubmitted after incorporating revisions and changes suggested by

expert(s).

- Re-submission may be allowed at least three months after intimation to the concerned supervisor.

Interpretation of Reports

- If dissertation is approved by the four examiners, the Dean shall allow the candidate to defend the dissertation in open defence.
- If any of the examiners suggests modification/revision of the dissertation, the candidate shall be required to resubmit a revised version of the dissertation, duly certified by the Supervisor, within one year.
- The revised dissertation shall be approved by the same examiner.
- Minor modifications will be incorporated without referring again to the examiner.

Evaluation Process if External Examiners Fail to Respond

- In case, one of foreign experts fails to respond within three months, the dissertation would be sent to the third foreign expert and then to fourth expert, if the third foreign expert also fails to respond within three months.
- In case, fourth foreign expert fails to respond within three months, a new panel shall be recommended for selection by the supervisor.
- The process would be repeated until evaluation reports by two foreign experts have been received.

Defence of Dissertation

- The Supervisor, after receiving experts' unanimous positive opinion, will confirm to Controller of Examinations that all requirements of the program have been met successfully for the conduct of Dissertation defence.
- The Dissertation defence shall be conducted by the panel of examiners consisting of local examiners (who

had reviewed the dissertation), members of the GEC (including the supervisor) and the Chairperson of the Department. All members of panel of examiners, well before the date of open defence, shall have complete access to the dissertation and the reports of external examiners. In case of non availability of a local external examiner (who had reviewed the dissertation), another local external examiner (as already suggested in the panel of eight external examiners) will be appointed by the VC in consultation with Dean.

- The Controller of Examinations will notify the date and place for holding the open defence.
- Prior to candidate's presentation, the Supervisor will



introduce the student.

- The candidate will make a detailed presentation of the research work.
- For maximum participation, the schedule of open defence of the Dissertation by the candidate shall be announced at least four weeks prior to its conduct.
- The Dissertation defence shall be open to the public but the evaluation will be done by the panel of

examiners.

- Consequent to the open defence, the panel of examiners will give its decision by a majority vote.

Submission of Dissertation

The dissertation submitted by PhD candidate shall comply with the following conditions:-

- It shall form a distinct contribution to knowledge and afford evidence of originality, shown by the discovery of new facts, by the exercise of independent critical judgment, and/by the invention of new methods of investigation.
- It shall not include research work for which a degree has already been conferred in this or any other university.
- Initially, the candidate shall submit four spiral bound copies of completed dissertation along with an application on prescribed form, duly recommended by the supervisor and the Chairman of the Department to the CoE, for evaluation of dissertation.
- At final submission six hard bound copies of dissertation with a soft copy each on CD, will be prepared for submitting of three copies to the University (out of which one set will be sent to HEC), one copy for the Department, one copy for the Supervisor, one for Library and one student copy.

Award of PhD Degree

HITEC University, on recommendations of Board of Advance Studies and Research (BAS&R) shall award degree of Doctor of Philosophy (PhD) in the relevant discipline to the students who satisfy the following

conditions:-

- **Course Work/Residency.** The minimum course work required shall be 18 credits of graduate level courses and two years of Residency. Only relevant graduate level courses or equivalent shall be counted towards the total course work requirements of PhD.
- **Research Work.** In addition to the course work, all students must register for 30 Credit Hours of doctoral research and volume of research work to be determined by the Supervisor.
- Passes Dissertation defence.
- The VC may approve the recommendations of the Board of Advanced Studies and Research on behalf of the Board of Governors regarding the award of PhD degree to the candidate.

Code of Ethics

- The candidate or his spouse or his relatives shall not communicate with external examiner(s) directly or indirectly.
- Any faculty member of the department shall not participate in the PhD process of a candidate at any stage, if the candidate is his/her blood relation or spouse or the faculty member is a candidate himself.
- External examiners may not be co-author of any publication with the candidate or his/her spouse or blood relative or supervisor.

Contacts

Engr Iftikhar Rehman

Controller of Examinations
Office: 051-4908146-9 Ext.304
E-mail: controller.exams@hitecuni.edu.pk

Mr. Danish Ali Khan Tanoli

Assistant Controller of Examinations
Office: 051-4908146-9 Ext.396
E-mail: asst.controller.exams@hitecuni.edu.pk

Student Affairs



Huma Fawad

Director Student Affairs,
PhD (in progress) SS-CASE IT,
M.Sc. Engg Management,
UET Taxila, MBA Marketing, B.Sc.
Mechanical Engineering, UET Lahore.

Student Affairs Office is responsible for all co-curricular and extra-curricular activities of the students in the Campus by providing them with various opportunities for their overall grooming and development. This office provides a variety of services and also looks after the overall discipline and welfare of the students, besides organizing, coordinating and supervising the co-curricular and extra-curricular activities, within and outside the University campus. Student Affairs Office also aims to cultivate and enhance students potential in sports, literature, music, culture, arts, social entrepreneurship and community development programs. The office maintains a close liaison with various industries and organizations for student projects, industrial visits, placement and internship programs besides arranging Inter University Events (Olympiad), Open House, Job Fair, Excursion Trips, etc.

Jinnah & Nusrat Hostels

A fully functional hostel facility is available at the campus to accommodate approx three hundred and ninety students. Jinnah Hostel, a purpose built facility can accommodate two hundred and eighty eight students, whereas, Nusrat Hostel can accommodate upto one hundred students. Fully furnished, well ventilated and airy rooms with allied facilities are provided to the students at very reasonable rates. This hostel complex offers indoor games, indoor gymnasium, TV room and a mosque for the students and faculty of the University. Similarly, an exclusive hostel facility is also available for girl students.

Transport

University owns a fleet of transport, vehicles consisting of buses and vans, for transporting students at nominal charges. The transport operates on two different routes. Route-1 covers Islamabad whereas; Route-2 facilitates students coming from Rawalpindi. Local transport is also available for students living in close proximity to the University.

Swimming Pool

The all-weather indoor swimming pool provides good leisure time activity to the students all year round. The water of the swimming pool is changed regularly and great attention is paid to maintain excellent hygienic conditions. Students can avail this facility at nominal charges.

Stadium

University stadium comprising of a laser levelled cricket ground with International standard cricket pitch along with a hockey ground provides an opportunity for students to practice their sports potential to the full. The lush green premises also aim to establish an athletic track around this ground to complete the periphery of the stadium in due course of time. Surrounded in the east and south by lush green Margalla mountain range, the stadium is also equipped with a net practice area for cricket with cemented pitch, a volleyball court and futsal facility.

Gymnasium

“Healthy body keeps a healthy mind”. A state of the art gym is present in HITEC sports complex. Students are encouraged to keep themselves fit and use the gym facilities during their spare time. Separate timings have been laid down for the male and female students to avail this facility. An additional facility of Aerobic Centre is also available for the students who are interested to learn the art of aerobics. Another state of the art Gym Facility is present in HITEC Hostel for resident students and faculty.

Nusrat Auditorium

Centrally air-conditioned “Nusrat Auditorium” having a seating capacity for 400 persons and equipped with the latest multimedia/public address system is available for organizing different kind of activities. Student societies arrange their functions and activities like debates, declamation contests, dramas, skits, ramp walk, musical, technical & scientific shows and exhibitions in Nusrat Auditorium.

Iqbal Auditorium

An excellent state of the art facility has been established for holding of Conferences and Seminars with seating capacity of 200 in the Iqbal auditorium.

Rumi Block

Currently two cafeterias are operational in the University Campus in the Rumi Block where fresh, hygienic and healthy food is available to students. The cafeteria provides clean atmosphere and serve traditional and fast foods at reasonable prices. Cafeteria performance in terms of quality of food, prices and overall cleanliness of

the area is monitored by a Food Committee comprising of faculty members and students.

Societies

Seven different clubs/societies have been established to look after various interests of students. These are managed by Student Office Bearers (Presidents, Vice Presidents, Secretaries, Joint Secretary and Treasurer).



The Student Affairs Office holds the annual student body selection and provides guidance to students along with the Faculty-in-charge of the respective society.

Literary Society

This society provides a learning atmosphere and encourages students to undertake literary activities. It holds Inter Department and Inter University debates/

declamation contests and also forms part of the Editorial Board of the University Magazine. Every year a debating competition “Pukaar” is launched on Olympiad along with Model United Nations Event called HITMUN.

Creative Art Society

The society makes efforts in promoting artistic talents of the students. It holds art competitions, variety shows and other cultural events. It also arranges art and craft exhibitions, funfairs and musical programs.

Adventure & Social Welfare Society

The society endeavors to create awareness of environmental issues among the students and undertakes cleanliness drives, tree plantation drives within and outside the University. It organizes different types of social events

to inculcate the spirit of social services, volunteerism and patriotism, among students. The society also organizes student excursion trips, trekking and paragliding activities for the students.

Sports Society

The society promotes sports activities among students by holding Inter Departmental sports competitions and encourages students to participate in all Inter University competitions. Basketball, football, cricket, hockey, volleyball, badminton and table tennis matches are held quite frequently.

Science Society

This society provides a forum to enhance the scientific knowledge of the students. It organizes Inter University project competitions/exhibitions and arranges quiz



shows, conferences and seminars, etc. This society also collaborates with other professional and technical student bodies like IEEE, ASHRAE, ASTM, SMEP, etc and provides students with assistance as and when required by them.

Character Building Society

The society has been entrusted with the responsibility to create awareness about importance of character and good working atmosphere through lectures, discussions and essay writing competitions, etc. It inculcates moral and ethical values among students.

Girls Society

Girls Society in HITEC University aims to develop leadership skills in girl students and provides them with equal opportunities to compete in various extra & co-curricular activities without any inhibition. Every year this society also partners with Pink Ribbon in its endeavors to spread awareness campaigns for girls related health issues.

Financial Assistance

There are several Financial Assistance Programs in the University and Student Affairs Office provides support to the departments during scholarship processing for need-cum-merit based scholarships. These programs are funded either by the University or by other organizations. Currently the Scholarships available are Razia Sultana Scholarship, University Financial Assistance Program based on Need cum Merit scholarship applicable from 2nd Semester, Abdul Mateen Ansari Scholarship, etc.

In each semester, University allocates and distributes a large amount of financial assistance to help needy and deserving students on need cum merit basis. In addition to that, all Huffaz students are entitled to receive stipend of Rs. 1000/- per month. Another loaning facility is available under Ehsan Trust Program by Meezan Bank of Pakistan

where interest free loans are provided by the bank for a limited number of students.

Student Counseling

Student Affairs Office is also responsible to promptly resolve any personal or collective problem faced by the students through personal counseling besides arranging for a professional help from a trained medical practitioner. A Psychologist is being hired by HITEC University to resolve these issues related to behavioral, adjustment issues, anxiety, depression issues, etc.

Open House (Job Fair)

To help students and alumni explore and make successful career choices, this Office assists the employers and the employees in meeting each other in the “Open House” every year, which is attended by a large number of executives of industries and organizations. It also ensures personal and professional development of the students.

Community Service

In order to generate a sense of ownership among the students for our community in general and societal responsibilities in particular, a community service program operates is being supervised by the Student Affairs office in collaboration with departmental Community Service heads. The significant projects of community service that took place in Fall 2018-Spring 2019 are projects in four schools in the rural area and vicinity of Taxila relating to establishment of Playgroup area for small children, solar electrification, provisioning of computers and class room equipment, etc. Spring 2019 program would be a continuation of “Ramadan Ration and Ramadan Dastarkhawn scheme by HITEC”, along with assistance to local schools etc. Community Service is declared mandatory program in 4 years time with 40 contact hours of service to the community a compulsion on each student.

Alumni & Placement Cell

Alumni is an integral part of any University and HITEC University also has a functional Alumni Body that is elected on biannual basis. This cell keeps a record of all HITEC graduates and facilitate their link with the University current students for training, skill development, motivational speaking and knowledge sharing activities.

This cell aims to expose HITEC graduating students to the latest skill sets and practices in the Industry as well through a series of activities to prepare our students with the challenges of professional life. This academia-industry platform provides a bridge for graduating students with the Industry professionals that would eventually benefit the students for their suitable placements after graduation. Currently the department facilitates on campus job interviews and tests and aims to enhance this activity to meaningful placement of our graduates in a timely manner. A monthly lecture series titled “Window to Industry” is held to support this liaison and HITEC invites professionals from all walks of life to share their expertise and experiences with the students.

There are two additional Groups established to further the work of this cell namely the Career Counselors group with faculty from each department carrying forward the task of preparing the students for upcoming interviews and testing skills besides guiding the students for future endeavors. The other group is to give support to the Industry Internships program that internally coordinates with the Industry Liaison Officers from each department and work together with placement to strengthen Internship bridge of finding good reputable companies to send HITEC Interns to and then to performance monitoring of all Interns during their time of service to the organization being committed to. This add on support to the students in likely to build meaningful channels for suitable placement opportunities in that organization.

Marketing & Media Cell

This cell is to support the functioning of the University Marketing Activity and is currently being run under the DSA Office in collaboration with all departments from building of marketing tools to building channels of promotion for the University for prospective student. The cell is responsible for the promotional activity through print, electronic and social media sites, etc. Visits for promotion to schools, colleges and participation in Education Expo are also the responsibilities of this cell besides branding and image building of the Institute.

Dress Code – Students

Boys:-

- Only Formal trousers and Dress Pants (Jeans and look alike are not allowed)
- Dress shirts only (T-shirt, sports shirt, etc not allowed)
- Shalwar Qameez (on Fridays only)
- Blazers jersey, coat, jackets (for winters), Closed shoes (slippers, sandals not allowed)
- Display of University student ID cards during University working hours is mandatory.

Girls:-

- Any decent Shalwar Qameez, trousers with Dupata / scarf.
- Blazer, jersey, coat, jackets, shawls (for winters)
- Jeans, tights, sleeveless, short shirts not allowed.(length of shirts to be at knee level)
- Closed shoes (sandals, slippers, pencil heels not allowed)
- Wearing of heavy / expensive jewellery and heavy makeup is not allowed.
- Display of University student ID cards during University working hours is mandatory.



Student Achievements in Inter University Competitions

Students of HITEC University being exceptionally talented in various dimensions are always very keen to participate in inter university events/competitions. Some of these competitions in which our students won top positions during session Fall 2019 and Spring 2020 are given below:

Quiz Competition at GTV Ramzan Transmission 2019

Syed Jarar Haider Naqvi, student of HITEC University has been invited in “GTV Ramzan Transmission 2019” and stood first in “Quiz Competition”.

Patari Talent Hunt at Islamabad

- Syed Zain Bin Qaiser, student of HITEC University participated in “Patari Talent Hunt” organized by “Patari (Musical Platform)” at Islamabad in January 2020 and secured first position in “Singing Competition”.

HITEC Olympiad’20

“HITEC Olympiad 20”, an Inter University competition organized annually by HITEC University was held from March 4th – 6th, 2020. Around 50 different universities and colleges participated in 60 different events from sports like cricket, futsal, badminton, table tennis, chess to qirat, naat, declamations, drama, singing, videography, sketching, photography, speed wiring, speed programming and e-gamming etc.

The Olympiad was inaugurated by Professor Dr. Muhammad Younas Javed, Vice Chancellor, HITEC University. Sports activities were held in the lush green lawns of HITEC with scenic Margalla Hills in the background while all indoor competitions were organized in comfortable halls and auditorium of the University.

Events were judged by prominent personalities to ensure non partiality. Mr. Nadeem Afzal Gondal, the spokesperson of the Prime Minister, was the honorable chief guest of closing ceremony. He expressed his appreciation of the event and congratulated the organizers for holding such a successful event and distributed prizes amongst the winners of the Olympiad.

Contacts

Huma Fawad

Director Student Affairs
dsa@hitecuni.edu.pk

Mr. Muhammad Rehan

Deputy Director Student Affairs
ddsa@hitecuni.edu.pk

Information Technology Services



Nauman Ali Khan

Manager Information Technology
MS (Computer Science)
nauman.ali@hitecuni.edu.pk

The purpose of IT Services is to create a digital campus in which students and staff can be as creative and productive as possible as they learn, teach, undertake research and run the routine activities. Our students have grown up with internet technologies and expect to be constantly connected, using their mobile devices. A technology rich experience is what they expect from University life. Our researchers produce a magnitude of data and need tools to manage, and generate information from it. Similarly, many of them also collaborate with others beyond disciplinary and organizational boundaries.

Moreover, some of our services are also typical of the corporate sector and hence offer similar challenges: managed PCs and laptops, storage, email, printing, web content management, data and voice networking, multimedia design and

production, and the enterprise business applications underpinning HR/ payroll facilities management and a range of commercial enterprises.

Furthermore, some services are University specific and create an interesting range of challenges for the IT function. Here the creation, sharing, analysis and dissemination of information are defining activities. Both students and researchers tend to be demanding, being innovative users of technology and so we aim to provide them an information environment in which they can be as creative and productive as possible.

Application Services

These services comprise e-learning, web designing, digital library system, admission system, online attendance system, and Microsoft Imagine that support technical education by providing access to Microsoft software for learning, teaching and research purposes. This ensures that classrooms have access to the latest cutting-edge technologies and software trends.

Campus Management System (CMS)

IT department has all processing capabilities to meet educational needs such as online admissions, semester registrations, student fees, class attendance, student evaluations (assignments, quizzes, Sessional exams, final exam etc.), result compilation and generation of transcripts and degrees.

Architecture, Security and Intrusion Detection

IT, being a vital feature provides the required level of security and intrusion detection by using modern security appliances and devices. The network team of IT department provides services on open source IDS to secure HITEC University core network from internal and external attacks. IT department also provides IT and management supports for file servers, domain controller, network management, Wi-Fi connectivity.

Servers

The university has 12 servers that include open source proxy servers, contingent proxy server, LMS (Moodle) server, CMS server, domain controller (centralized administration), file server, Fedena (payrolls system) server, cluster server up to 48 cores, news server, web server,

and backup domain controller server.

Equipment

The university routers are configured with OSPF algorithm along with ACL configuration. Manageable layer 2 switches are used for VLAN and broadcast segmentation. CISCO Adaptive Security Appliance (ASA) firewall is also used for campus network security. University network space currently has 3000 active users.

Internet

A high-speed Internet connection of 100 Mbps dedicated bandwidth is available for students and faculty members for 24 hours a day and 7 days a week. The bandwidth of 750 KB is allotted to each student for downloading software from the Internet. Wi-Fi hotspots are also available to the students and faculty throughout the university.

PERN

The Pakistan Education and Research Network (PERN) from the HEC connects HITEC University with other

research institutes through high-speed internet bandwidth. The main purpose of this network is to facilitate researchers for sharing their results and to coordinate with each other through video conferencing.

Data Center

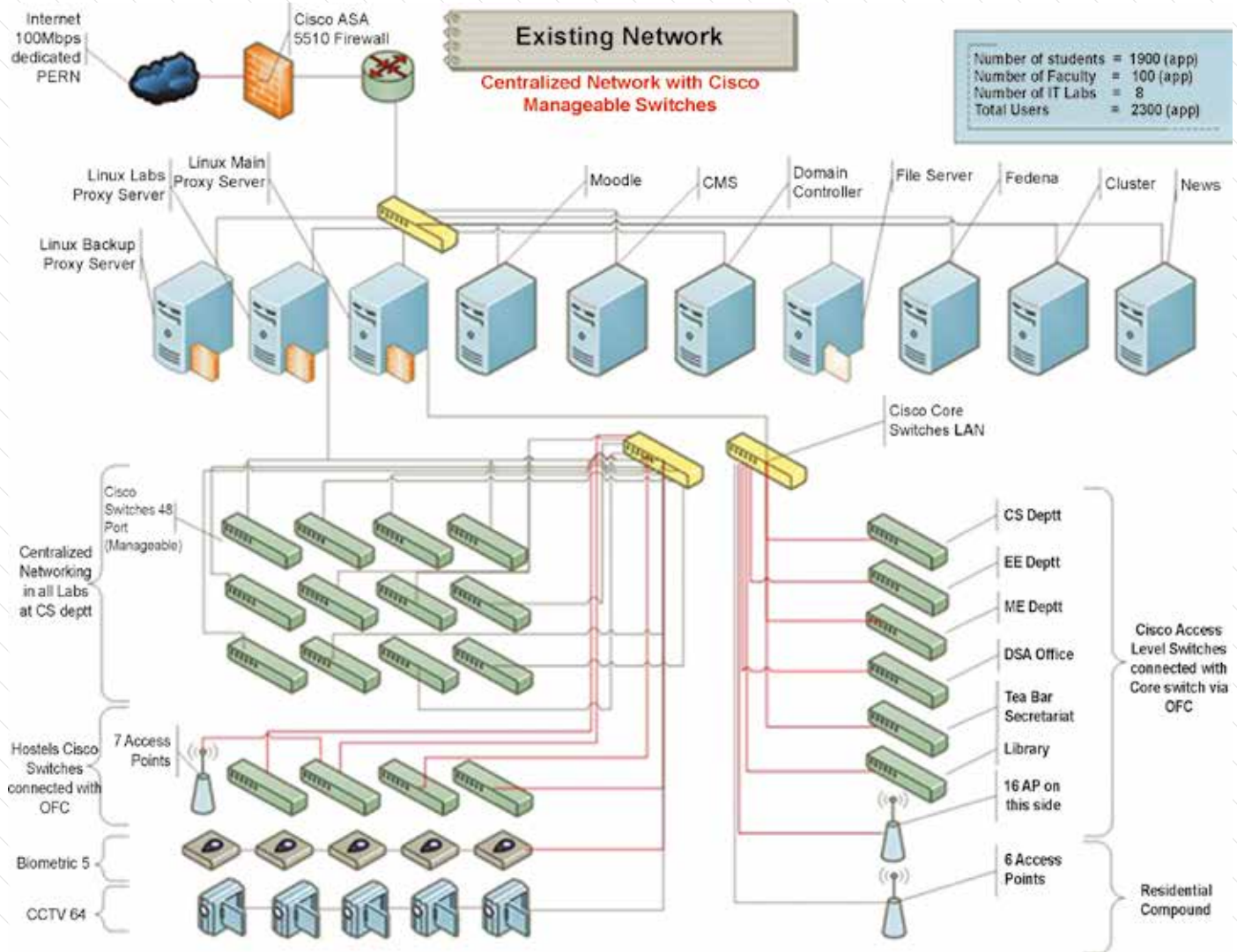
The Data Center provides private cloud and cluster services to facilitate deployment of applications without the cost and complexity of buying and managing the under-lying hardware and software layers.

Library Automation

A Gigabyte optical fiber cable connects the library with the university data center. Library is fully automated by EM system and library management system that provide facilities like log in and check out for borrowing and returning library books. Library of the university is connected with the HEC digital library through public IP network for providing access to the large number of journals and other research material at national and international level.



The physical layout of our I.T Network



HITEC University Library



Abrar Ahmed

Librarian
MS (Library & Information Science)
librarian@hitecuni.edu.pk

HITEC University Library forms an essential complement of academic pursuits of our faculty and students. The Library provides access to materials and information resources which will help you in your studies. All new students are offered an orientation tour of the Library.

The Library is located in the basement of “Masjid-e-Noor”, a hallmark of the HITEC and housed in the precincts of

our Religious Education Center. It is open till late night from Monday to Friday and also functions occasionally on weekends. Library is fully automated with electromagnetic security system and a Library Management System (LibMax). Online Public Access Catalog (OPAC) is also available to the users. It helps speedy search of a particular title. Full contents of University Library books and HEC Digital Library can be viewed from any faculty office directly. The Library complies with “Dewey Decimal Classification” System and “Library of Congress Subject Headings (LCSH)” tools. It also provides scanning, photocopying, and WIFI facilities to all users.

Besides hosting a repository of over thirty two thousand books covering not only Electrical, Mechanical and Computer Engineering and Computer Science domains, but Humanities, Islamic Studies and a unique collection of titles in Advanced Mathematics as well. It subscribes to 25 printed and online versions of professional journals covering IEEE, Elsevier, etc. and also provides access to various databases.

Our students and faculty also enjoy access to HEC provided journals and magazines. Similarly, its audio-visual collection comprises more than sixteen thousand items, including presentation slides, e-Books and dissertations etc. A student is permitted to draw a maximum of 7 books, at a time, for a loan period of two weeks.

Our staff, well qualified in Library Sciences, is always at hand to provide the requisite help in searching and locating resources, information and referral services you may need.



Convocation 2020



How to Apply Online

- Access the University website www.hitecuni.edu.pk.
- Register using your email address.
- A password will be sent at your email address.
- Login at the given link to fill Online Application Form.
- Upload candidate photograph with blue background (300 kb or less in size).
- Application confirmation will be sent at the given email address within 24 hours of submission.
- Print Application Form along with challan slip.
- Pay the cost of Prospectus in any online branch of Bank Alfalah Ltd.
- Candidates can also send bank Draft in favour of HITEC University Taxila, instead of Bank Challan. By clearly writing the name of candidate, CNIC Number and Challan Number (mentioned on the challan slip) at back of Bank Draft.
- Send the printed Application Form along with paid challan slip (HITEC University Copy) or Bank Draft and attested copies of required academic documents through courier or registered mail to; The Registrar, HITEC University Taxila, Museum Road Taxila Cantt.
- Facility to fill Application Form online is also available in the University.

Contact

Ph: 051-4908146-49 (Ext-309), 051-4908144

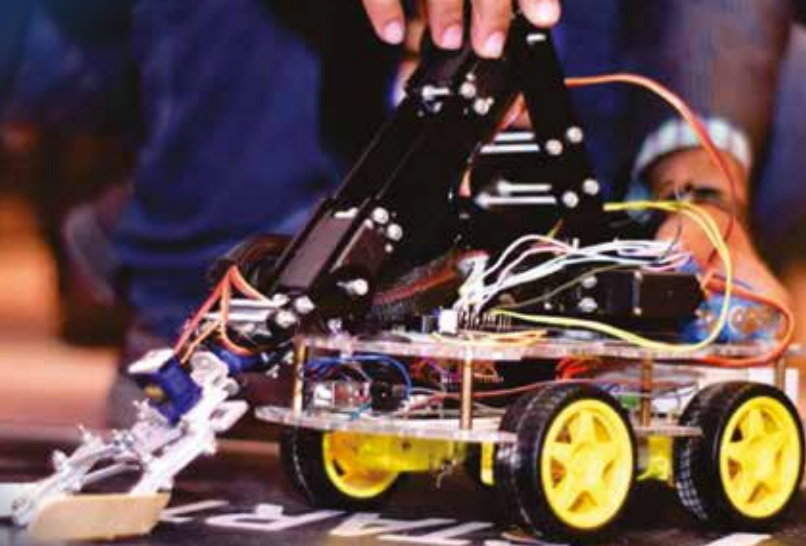
Email: admissions@hitecuni.edu.pk assistant.registrar@hitecuni.edu.pk

Disclaimer

The information in this prospectus is correct at the time of printing. It provides general guidance to the students and does not form part of any contract. The University would endeavor to provide the courses and facilities described herein, but reserves the right to make alterations in its programs, policies and fees tariff at any time, if necessary.







HITEC University, Taxila

Tel: 051-4908146-49 Fax: 051-4908145

Website: <https://hitecuni.edu.pk>
