Prospectus 2019-2020

HITEC University, Taxila


رب زدني علما
رب اشرح لي صدري ويسر لي أمري واحلل عقدة من لساني يفقهوا قولي

Contents

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 Ordinance 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.	**Lieutenant General Abdullah Dogar, 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.	**Major General Akbar Saeed Awan (Retd), HI (M)** Chairman National Technology Council, HEC, Islamabad	Member
4.	**Major General Syed Jamal Shahid (Retd), HI (M)** Former Director Procurement Fauji Foundation Rawalpindi	Member
5.	**Chairman** Higher Education Commission, Islamabad	Member
6.	**Prof. Dr. Muhammad Younus Javed** Vice Chancellor, HITEC University Taxila	Member & Secretary
7.	**Vice Chancellor of a Public Sector University** to be nominated by the Chancellor	Member
8.	**Brigadier Dr. Shoab Ahmed Khan, TI (M)** Prof / CEO CASE Islamabad.	Member
9.	**Brigadier Nadeem Iqbal** Director Technical, Heavy Industries Taxila	Member
10.	**Brigadier Osamah Majeed** Managing Director, HRF(M), Heavy Industries Taxila	Member
11.	**Brigadier Imran Haider Sherazi** Director Administration, Heavy Industries Taxila	Member
12.	**Colonel Ajmal Rafique** Managing Director, APCF, Heavy Industries Taxila	Member
13.	**Mr. Ammar Saddique Khan** Member Provincial Assembly of the Punjab	Member
14.	**Mr. Jahangir Khanzada** Member Provincial Assembly of the Punjab	Member
15.	**Mrs. Sabrina Javaid** Member Provincial Assembly of the Punjab	Member
16.	**Secretary to the Government** Higher Education Department, Punjab	Member
17.	**Member** Punjab Higher Education Commission, Lahore	Member

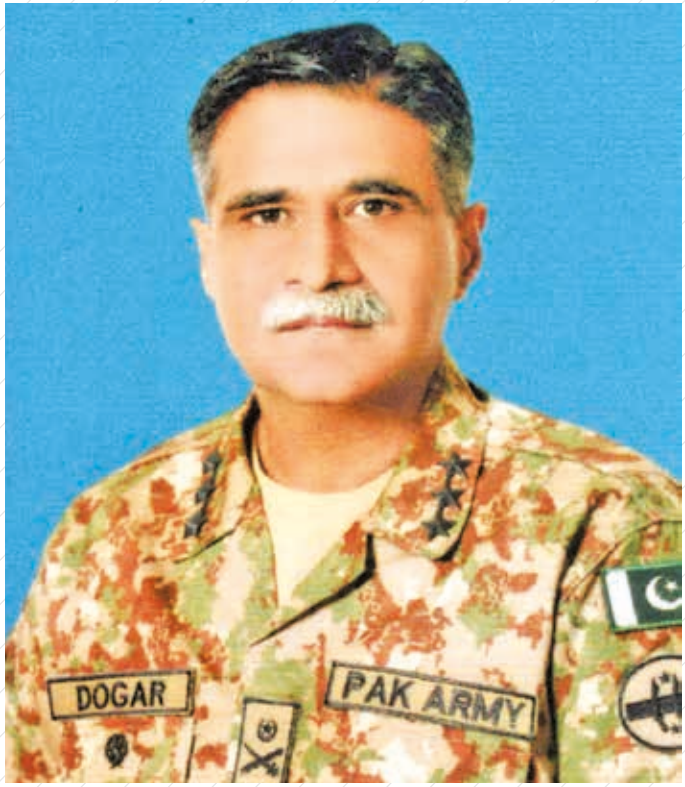
Message from Chairman Board of Governors

It is indeed satisfying that HITEC University has made significant growth since grant of its Charter in 2009. The University maintains a high standard of teaching, research and has created a distinguished position for itself in the comity of Higher Education Institutions. This distinction speaks volumes to the commitment, and dedication of faculty, staff and management of the University.

The contribution of HITEC University in the national efforts to broaden the base of scientific and engineering education is praise-worthy. It has graduated competent and quality engineers, scientists and Islamic scholars who are capable of meeting the modern day challenges effectively. The shifting of its teaching to Outcome Based Education (OBE) under the umbrella of Washington Accord and accreditation of its Engineering Programs under the OBE System reflects the high quality standards being followed by the University. This has opened the doors for its graduates for employment at national and international levels.

It is a matter of great satisfaction that HITEC University has established strong foreign linkages with leading universities of UK, Turkey and Malaysia. The University is also a founding member of Asia Technological University Network (ATU-Net) established under the patronage of Universiti Teknologi Malaysia (UTM). I am confident that our undergraduate and postgraduate students will take full advantage of excellent research and learning opportunities available in these leading world institutions.

The Board of Governors and University management is fully committed to satisfy the development needs of the University, and provide excellent environment for the academic learning and moral grooming of the students. Our emphasis remains on the continuous up-gradation and



improvement of campus infrastructure and allied facilities. University has also planned to launch new programs to increase the student population in engineering and other disciplines under the leadership of new Vice Chancellor.

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

Lieutenant General
Abdullah Dogar, HI(M)

Message from the Vice Chancellor

Welcome to the HITEC University which excels in preparing the human resource for coping with the challenges of technological advancements in global context. We ensure conducive environment where scholars acquire knowledge, develop advanced skills and gain the capability to innovate solutions for the industry. The objective is to improve the quality of life in our society. Our educational programs are a holistic healthy blend of social sciences, engineering, business practices and, above all, ethical values.

We host foreign qualified and highly skilled faculty who pursue creative teaching methods and also actively undertake research projects involving their students. Our spacious and extremely well-equipped Laboratories are enviously viewed by many of our competitors. We nurture critical thinking and problem solving capabilities by working through interdisciplinary teams. 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.

HITEC University has a brilliant legacy of 12 years and is reckoned to be an Institution par excellence among the elite universities of Pakistan. 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).

In addition to undergraduate programs, we also offer MS/PhD level education in Electrical, Mechanical and Computer Engineering as well as in Computer Science, Mathematics and Islamic Studies. Besides advanced course work, the research phase of all these postgraduate programs is supervised by very competent, well-accomplished and renowned HEC approved supervisors.

HITEC University is also eligible for financial support programs through public funding for faculty development, research pursuits, foreign faculty hiring and infrastructure development.

Our mutual collaborative student-exchange programs provide unique opportunities to our students to partially complete their educational programs in reputed universities abroad at low cost. Our university is also a pioneer member of Asia Technological University Network (ATU-NET). It is 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. 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. Our most valued possession, however, is our student body! So, if you aspire to get first class professional education to groom you into a holistic professional, fit to serve anywhere in the world, just join us. We will do the rest. I do wish to welcome you in the HITEC University.

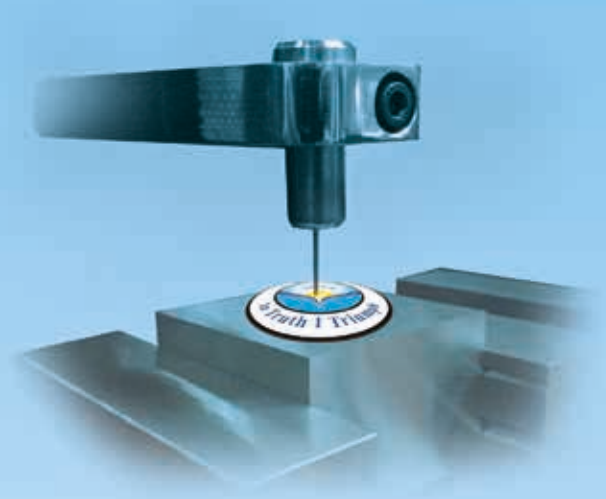
Prof Dr Muhammad Younus Javed, SI (M)

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 flourishment, 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.

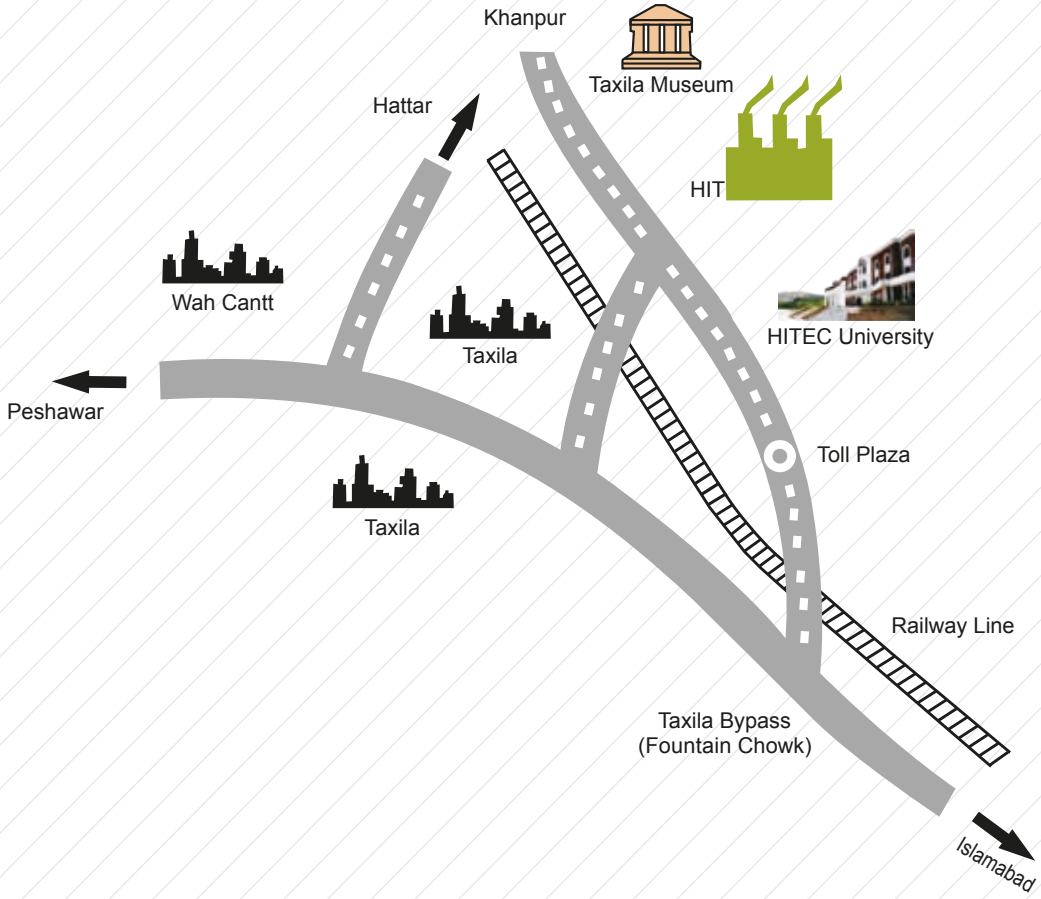
In addition to the ruins of Gandhara civilization and ancient Buddhist/Hindu culture, relics of Mughal gardens and vestiges of historical Grand Trunk Road, which was built by Emperor Sher Shah Suri in 16th century, also exist in Taxila region.

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

Dr. S. Kamran Afaq
Dean

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.

Faculty of Engineering and Technology comprises three departments i.e. Department of Mechanical Engineering DME, Department of Electrical Engineering DEE and Department of Computer Science & Engineering DCS&E. The Departments of Mechanical Engineering and Electrical Engineering offer BS, MS and PhD programs in their respective areas of engineering, whereas, the Department of Computer Science & Engineering offers BS Computer Science, MS Computer Science and BS Computer Engineering programs. As per 25 year Development Plan, new departments will also be added to the faculty of Engineering and Technology. The Department of Civil Engineering is scheduled to accept its first intake from September 2019.

We follow the Semester System of education and all the BS programs are duly accredited and recognized by the relevant governing and professional bodies like the Pakistan Engineering Council PEC and National Computing Education Accreditation Council NCEAC and our programs strictly adhere to the guidelines of the HEC Higher Education Commission of Pakistan so as to impart quality education to our students. Our BS Computer Science program is accredited as the highest category 'W' by the NCEAC.

We follow Outcome Based Education OBE system of education and assessment, under the world renowned Washington Accord, in our engineering programs. This further enhances the quality and standard of education, increases and facilitates the mobility of our graduate engineers all over the world.

Our highly qualified, professionally competent, research oriented and experienced faculty members ensure effective and outcome based teaching, research and development, as per the set standards and objectives of PEC, HEC, NCEAC and OBE of the Washington Accord. Besides keeping themselves abreast with the latest developments in knowledge of their respective domains, the faculty members actively participate in the R&D activities. This incites new ideas and innovative thinking to guide our students in their research and its practical implementation. The minimum qualification for teaching undergraduate classes is an MS / M Phil degree in the relevant field. Similarly, all MS and PhD level courses are taught by the faculty members possessing PhD qualification in their relevant areas of specialization.

Our students undertake research projects and actively participate in various curricular, co-curricular and extra-curricular activities and competitions, organized by HITEC University and other institutions of the country and win laurels. The dean E&T is committed to facilitate the faculty members for acquiring funding from national and international agencies, conducting international conferences and in publication of their research in high impact factor journals. Similarly, commercializing the research in collaboration with industry and in doing pragmatic research in the context of Pakistan's socio-economic needs, under the umbrella of ORIC is also accorded top priority.

HITEC University is very fortunate to have a complete heavy industrial setup in the form of Heavy Industries Taxila (HIT) at a close proximity. This enables our students to undertake industrial level projects, involving tool design, engine testing, explicit dynamic analysis, fatigue analysis and material selection. Industry sponsored projects help reduce the financial burden on the students.

Therefore, if you aspire to be a proficient Electrical Engineer, Mechanical Engineer, Computer Engineer or an accomplished Computer Scientist, we are here to groom and equip you with the requisite knowledge, skills and attitude for your acceptance in the national and international job markets.

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 Engineering program is duly accredited by Pakistan Engineering Council under OBE system, whereby, 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 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 unswerving 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 of Electrical Engineering

Faculty

Dr. Ejaz Muhammad

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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-405	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

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 129.

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 87.

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 129.

MT-202: Numerical Methods

For contents, please refer to page number 130.

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.

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 55.

ME-211: Computer Aided Engineering Drawing

For contents, please refer to page number 53.

IS-211: Islamic Studies

For contents, please refer to page number 143.

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 88.

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 131.

EE-303: Microprocessor and Interfacing Techniques

Pre-Requisite: Digital Logic Design

Introduction to Intel x86 family of µPs; history and applications; programming model; data addressing modes and assembly language programming; 8086 µP pin functions; bus timings and interfacing techniques; introduction to AVR µC, its history, and applications; µC 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 144.

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 55.

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 Eb/No, 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

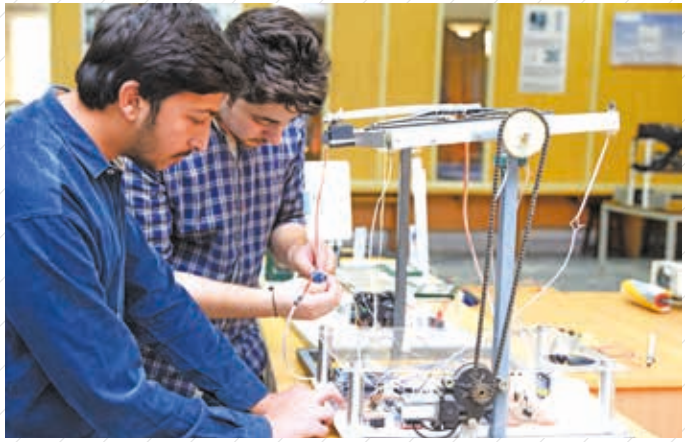
Pre-Requisite: Computing Fundamentals

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 los 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.

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.

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

Course Code	Course Title	Credit Hours
EC-802	Advanced Digital Systems Design	3-0
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

Department of Mechanical Engineering

Dr. S. Kamran Afaq
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 of Mechanical Engineering

Faculty

Dr. S. Kamran Afaq (HEC Approved Supervisor)

Designation: Professor & Chairman
Qualification: PhD University Paol Sabatier, Toulouse III, France
Area of Interest: Composite Material Structures (Design & Testing), Heat Transfer, Finite Element Analysis
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Dr. Muhammad Zain-ul-Abdein (HEC Approved Supervisor)

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Mr. Abdul Aleem

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Designation: Lecturer
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Designation: Lecturer
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Designation: Lecturer
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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-103: Differential Equations

For contents, please refer to page number 129.

EC-110: Computing Fundamentals

For contents, please refer to page number 87.

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, scriber, 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 129.

MT-202: Numerical Methods

For contents, please refer to page number 130.

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.

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, life 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 143.

EE-220: Fundamentals of Electrical Engineering

For contents, please refer to page number 27.

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 131.

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 30.

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 25.

HS-103: Communication Skills

For contents, please refer to page number 26.

HS-201: Technical Report Writing

For contents, please refer to page number 26.

HS-401: Professional Values & Ethics

For contents, please refer to page number 144.

HS-402: Economics

For contents, please refer to page number 30.

HS-403: Management & Entrepreneurship

For contents, please refer to page number 31.

HS-404: Foreign Language

For contents, please refer to page number 31 & 32.

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 Jacobeans, 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, tacho-generators, 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-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
- Metheletics
- 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 Science and Engineering

Dr. Junaid Ali Khan
Chairman

The Department of Computer Science and Engineering was established in Spring 2014 with the aim 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, Pakistan Engineering Council and National Computing Education Accreditation Council.

The Bachelor of Science in Computer Science program has been designed to produce professionals having sound computing knowledge, complex problem solving capabilities, critical thinking towards problem design and analysis. 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.

The Bachelor of Science in Computer Engineering 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 graduate computer engineers 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. The Department is also offering MS in Computer Engineering with effect from Fall 2018 keeping in view ever increasing demands of the industry, availability of the qualified faculty and the required 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.

In Spring 2019, the Department 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. 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 of
Computer Science and Engineering

Faculty

Dr. Muhammad Younus Javed (HEC Approved Supervisor)

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Ms. Kaynat Rana

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Engr. Shahbaz Khan

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Engr. Basit Akram

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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

Course Code	Course Title	Cr. Hr.
CS-305	Computer Graphics	2+1
CS-309	Web Design and Development	2+1
CS-310	Distributed Computing	3+0
CS-311	Data Warehousing	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-404	Data and Network Security	3+0
CS-406	Digital Image Processing	2+1
CS-407	Fundamentals of Data Mining	3+0
CS-410	Artificial Neural Networks	2+1
CS-411	Computer Vision	3+0
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-418	Logical Paradigm of Computing	3+0

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 25.

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 129.

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 144.

MT-203: Linear Algebra

For contents, please refer to page number 130.

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 26.

MT-103: Differential Equations

For contents, please refer to page number 129.

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 capitanancing / 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 144.

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 26.

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 87.

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: Multivariate Calculus

For contents, please refer to page number 130.

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 143.

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 131.

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 144.

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 30.

HS-403: Management and Entrepreneurship

For contents, please refer to page number 31.

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 31 & 32.

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 55.

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.

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 take10 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
EE-801	Advanced Computer Architecture	3+0
CS-802	Advanced Algorithm Analysis	3+0
EC-803	VLSI Architecture & Design	3+0
EC-805	Microcontroller system design & applications	3+0
EC-809	High performance programming with multicore & GPUs	3+0
CS-811	Advanced Computer Networks	3+0
CS-813	Network Simulation & Modeling	3+0
CS-814	Multimedia Communication	3+0
CS-815	Cryptography & Network Security	3+0
CS-816	Advanced Wireless Networks	3+0
CS-817	Research Trends in Pervasive Computing	3+0
CS-818	Network Performance Evaluation	3+0
CS-819	Information Theory & Coding	3+0
CS-822	Advanced Digital Image Processing	3+0
CS-823	Machine Learning	3+0
EC-825	Embedded Control Systems	3+0
CS-827	Advanced Pattern Recognition	3+0
CS-829	Advanced Computer Vision	3+0
CS-831	Advanced Database Management Systems	3+0
EC-831	Advanced Digital Signal Processing	3+0
CS-832	Data Mining	3+0
CS-835	Advanced Web Analytics	3+0
CS-837	Distributed Database Systems	3+0

Course Code	Course Title	Credit Hours
CS-838	Data Visualization	3+0
CS-839	Multimedia and Web Databases	3+0
CS-841	Advanced Software Engineering	3+0
CS-845	Research Trends in Requirement Engineering	3+0
CS-846	Intelligent User Interfaces	3+0
CS-847	Global System Development	3+0
EC-853	Pattern Recognition & Analysis	3+0
CS-857	Parallel & Distributed Systems	3+0
CS-876	Neural and Fuzzy Systems	3+0
CS-877	Soft Computing	3+0
CS-878	Intelligent Systems	3+0
CS-879	Multimedia Systems and Applications	3+0
CS-880	Mobile Communication Systems	3+0
CS-881	Advanced Big Data Analysis	3+0
CS-882	Contemporary Issues in Distributed Database Systems	3+0
CS-883	Advanced Cloud Computing	3+0
CS-884	Advanced Evolutionary Computing	3+0
CS-885	High Performance Computing	3+0
EC-892	Real Time Systems	3+0
CS-910	Selected Topics in Computer Networks	3+0
CS-920	Selected Topics in Digital Image Processing	3+0
CS-930	Special Topics in Database Management Systems	3+0
CS-941	Selected Topics in Software Engineering	3+0

Computer Science and Engineering Laboratories

Practical experience is part and parcel of every professional institution. The Department of CS&E maintains 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.

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
EC-111	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-201	Engineering Project Management	3+0
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	**18**

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-231	Operating Systems	3+1
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	**18**

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 25.

HS-101: English

For contents, please refer to page number 25.

MT-101: Calculus and Analytic Geometry

For contents, please refer to page number 129.

EE-102: Electric Circuit Analysis

For contents, please refer to page number 25.

HS-102: Pakistan Studies

For contents, please refer to page number 144.

HS-103: Communication Skills

For contents, please refer to page number 26.

MT-103: Differential Equations

For contents, please refer to page number 129.

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.

EC-111: Programming Fundamentals

Fundamental programming concepts, Translation of algorithms to programs, data types, variables, expressions, control structures, problem solving using sequence, selection and iteration, functions, arrays, strings, structures, pointers, records, file handling, design, development and testing of complex engineering problems.

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 26.

MT-201: Complex Variables and Transforms

For contents, please refer to page number 129.

MT-202: Numerical Methods

For contents, please refer to page number 130.

CS-204: Software Engineering

For contents, please refer to page number 72.

EE-205: Electronic Devices and Circuits

For contents, please refer to page number 27.

IS-211: Islamic Studies

For contents, please refer to page number 143.

ME-211: Computer Aided Engineering Drawing

For contents, please refer to page number 53.

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 131.

CS-302: Artificial Intelligence

For contents, please refer to page number 73.

EE-304: Communication Systems

For contents, please refer to page number 29.

CS-305: Computer Graphics

For contents, please refer to page number 73.

CS-308: Software Quality Assurance

For contents, please refer to page number 74.

CS-309: Web Design & Development

For contents, please refer to page number 74.

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 144.

HS-402: Economics

For contents, please refer to page number 30.

HS-403: Management and Entrepreneurship

For contents, please refer to page number 31.

HS-404: Foreign Language

For contents, please refer to page number 31 & 32.

CS-406: Digital Image Processing

For contents, please refer to page number 76.

CS-407: Fundamentals of Data Mining

For contents, please refer to page number 77.

ME-407: Health Safety and Environment

For contents, please refer to page number 55.

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-852	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	3+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
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 (New Program)

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 of Civil Engineering

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 Sarfraz Faiz

Designation: Lecturer
Qualification: MS (Geotechnical Engineering), NUST, Islamabad
Areas of Interest: Slope Stability, Site Improvement, Soil Investigation, Piling Works
Contact: sarfraz.faiz@hitecuni.edu.pk

Engr. Safeer Ahmad Zaheer

Designation: Lecturer
Qualification: MSc (Structural Engineering), Budapest University of Technology and Economics, Hungary
Area of Interest: Concrete Technology, Structural Engineering
Contact: safeer.ahmad@hitecuni.edu.pk

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

Engr. Muhammad Asif

Designation: Lab Engineer
Qualification: MSc in progress (Water Resources and Irrigation), UET, Taxila
Areas of Interest: Computational Fluid Dynamics, 3D Numerical Modeling of Vegetated Open Channel Flows, Hydraulic Structures
Contact: muhammad.asif@hitecuni.edu.pk

Curriculum - 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.

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 143.

CE-103: Basic Electro Mechanical Engineering

Electrical Elements and Circuits, Electric current, voltage, power and energy, Ohm's law, inductance, capacitance, Kirchhoff'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 129.

HS-101: English

For contents, please refer to page number 25.

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 144.

EC-110: Computing Fundamentals

For contents, please refer to page number 87.

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 26.

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 129.

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 144.

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 26.

MT-202: Numerical Methods

For contents, please refer to page number 130.

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

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 131.

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 30.

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 55.

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 31 & 32.

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 plats 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.

FACULTY OF BASIC SCIENCES

Dr. Syed Tauseef Mohyud-Din
Dean

Faculty of Basic Sciences comprises Departments of Mathematics and Islamic Studies. Both the Departments offer undergraduate and post graduate programs. However, all Mathematics and Islamic Studies courses of the undergraduate levels are also conducted by the departments of Mathematics and Islamic Studies.

The faculty of these Departments is recognized for its excellence in research. Over the years, it has been very revolutionary in its approach to curriculum and course offerings. In designing the MS and PhD courses, the faculty has endeavored to stay upto-date. Similarly, the courses offered at bachelor level to the students of other departments, are also state of the art.

We are passionate about delivering inspirational, innovative and cutting edge subject matter. This is our ethos and these goals are embedded in our strategy.

Our staff is 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 for themselves through research led-teaching.

Inquiry-based learning (IBL) is an important element of the `research-led´ learning experience. `IBL´ describes a cluster of strongly student-centered approaches to learning and teaching.

Students initiate inquiries that enable them to engage actively with the concepts and questions of their discipline(s), often in collaboration with each other. Learning 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 remains 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 Sciences ensures attainment of our objectives.

The Faculty is led by Prof. Dr. Syed Tauseef Mohyud-Din, who has unique distinction of producing first PhD in Mathematics in our University. He has published his research work extensively in journals of international repute. His expertise in the realm of research has won him several awards of excellence namely; Best Research Paper Award 2010, President's Pride of Performance Award on 23rd March, 2012 and the Research Productivity Awards (in category A) 2011 and 2012. He has also published 39 research papers in ISI index impact factor journals in the current year.

Department of Mathematics

Dr. Muhammad Tahir
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 17 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 by the Department. National and International keynote speakers are invited to present their research work at the occasion.

Faculty of Mathematics

Faculty

Dr. Muhammad Tahir

Designation: Professor and Chairperson
Qualification: PhD (Mathematics) University of Wales, United Kingdom
Area of Interest: Numerical Solution of PDEs, Numerical Linear Algebra, Computational Number Theory
Contact: mtahir@hitecuni.edu.pk

Dr. Syed Tauseef Mohyud Din

Designation: Professor
Qualification: PhD (Mathematics) COMSATS University Islamabad
Area of Interest: Differential Equations, Analytical and Numerical Techniques, Solitary Wave Theory
Contact: syedtauseefs@hitecuni.edu.pk

Dr. Zahid Iqbal (HEC Approved Supervisor)

Designation: Assistant Professor
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. 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: ehnber.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
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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
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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
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Dr. Farman Ullah Khan

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

Curriculum - 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:

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: N, Z, R, P(A), well-ordered sets and induction, inductively ordered sets and Zorn's lemma, mathematical logic.

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 R1, 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 R1

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 mess 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; equimomental 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 reminder, the derivative in Rn , the Darboux integral in Rn, The Riemann integral in Rn, 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, Miline–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

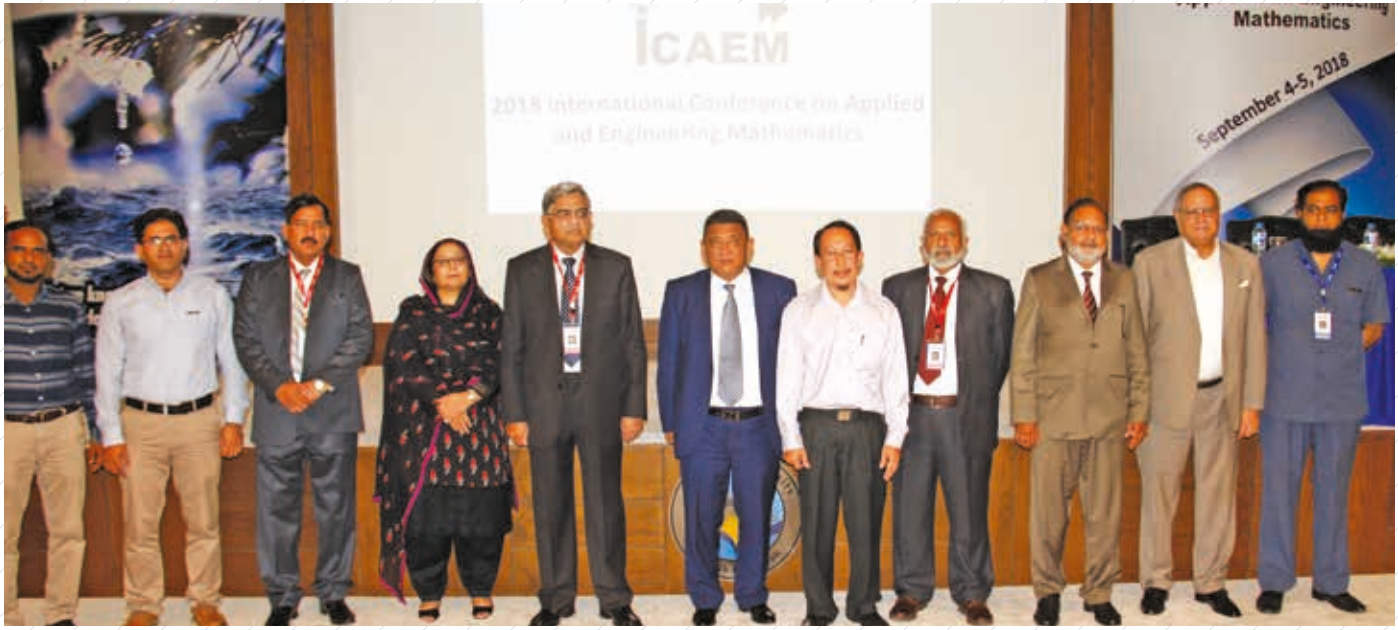
Examples of fuzziness, modeling of fuzziness, operations on fuzzy sets, fuzziness as uncertainty, boolean algebra and lattices, equivalence relations and partitions, composing mappings, isomorphism and homomorphism, alpha cuts, images of alpha level sets, fuzzy quantities, fuzzy numbers, fuzzy intervals, 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 A5, Frobenius-Burnside lemma, G-invariance, relationship between morphisms and congruences, order preserving one-one correspondences between congruences on Ω and subrroups H of G that contain the stabilizer Gα, 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 An 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' 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 varieities, Hilbert basis theorem, decomposition of variety into irreducible components, Hilbert's nullstellensatz, the sectrum of a ring, projective variety and the homogeneous spectrum, functions and morphisms, rings and modules of franctions 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 topologics 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 transhipment 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 143.

HS 404: Foreign Language

For contents, please refer to page number 31 & 32.

HS-401: Professional Values & Ethics

For contents, please refer to page number 144.

HS-101: English

For contents, please refer to page number 25.

HS-102: Pakistan Studies

For contents, please refer to page number 144.

HS-103: Communication Skills

For contents, please refer to page number 26.

HS-201: Technical Report Writing

For contents, please refer to page number 26.

HS-402: Economics

For contents, please refer to page number 30.

HS–403: Management & Entrepreneurship

For contents, please refer to page number 31.

CS-101: Introduction to Information and Communication Technologies

For contents, please refer to page number 70.

EC-110 Computing Fundamentals

For contents, please refer to page number 87.

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, Lenr'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
MTH-801	Perturbation Methods-I	3+0
MTH-805	Mathematical Modeling	3+0
MTH-806	Mathematical Essentials for Cryptography	3+0
MTH-807	Relativistic Astrophysics	3+0
MTH-808	Advanced Ordinary Differential Equations with Applications	3+0
MTH-809	Advanced Numerical Analysis	3+0
MTH-810	Numerical Linear Algebra	3+0
MTH-812	Computational Fluid Dynamics	3+0
MTH-815	Boundary Value Problems-I	3+0
MTH-817	Integral Equations and Applications	3+0
MTH-818	Advanced Partial Differential Equations and Applications	3+0
MTH-820	Variational Inequalities and Applications	3+0
MTH-821	Numerical Solution of Partial Differential Equations	3+0
MTH-823	Finite Element Analysis-I	3+0
MTH-824	Advanced Numerical Linear Algebra	3+0
MTH-826	Advanced Mathematical Physics	3+0
MTH-828	Advanced Cryptography	3+0

Course Code	Course Title	Credit Hours
MTH-829	Fractional Calculus & Applications	3+0
MTH-831	Numerical Solution of Boundary Value Problems for ODEs	3+0
MTH-832	Advanced Fluid Mechanics	3+0
MTH-833	Non-Newtonian Fluid Mechanics	3+0
MTH-834	Numerical Optimization and Applications	3+0
MTH-835	Integral Transforms and their Applications	3+0
MTH-836	Turbulence Modeling	3+0
MTH-837	Thermal and Concentration Boundary Layer	3+0
MTH-838	Mathematical Theory of Elastodynamics	3+0
MTH-839	Advanced Numerical Techniques*	3+0
MTH-840	Mathematical Theory of Liquid Chromatography	3+0
MTH-841	Statistical Mechanics	3+0
EM-501	Topics of Engineering for Mathematicians	3+0
MTH-869	Thesis (MS level)	6+0
MTH-886	PhD Thesis	30+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 ISLAMIC STUDIES

Dr. Muhammad Tufail Hashimi
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 of Islamic Studies

Faculty Members

Prof. Dr. Muhammad Tufail Hashimi

Designation: Professor Chairman ISD
Qualification: PhD Islamic Studies, University of the Punjab
Contact: tufail.hashmi@hitecuni.edu.pk

Dr. Taj Uddin al-Azhari

Designation: Associate Professor
Qualification: PhD in Islamic Studies University of Punjab, MA in Hadith, Al-Azhar University Egypt
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Dr. Manzoor Ahmad Alazhari

Designation: Associate Professor (Honorary)
Qualification: PhD Legal Policy Al-Azhar University, Egypt. Post Doc. University of Oxford, UK
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Mr. Babar Shehzad

Designation: Program Coordinator
Qualification: MS (Management Sciences) COMSATS University, Islamabad
Contact: coordinatorirer@hitecuni.edu.pk

Curriculum

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 kenosis.

IS-101 Tajwid Quran تجوید قرآن

تجوید کا تعارف، تجوید سیکھنے کے فوائد، ترتیل قرآن، تدویر، حدر، تجوید سے قرآن خوانی کی اہمیت اور تجوید میں عام اغلاط، الفاظ کا تلفظ، حروف کی صفات، حروفِ علّت، حروف اور الفاظ کو ملانے کا طریقہ اور قواعدِ تجوید۔ مشق

AR-101 Arabic Language عربی زبان

روزمرہ عربی، عربی بول چال، ملاقات، تعارف، خاندانی تعلقات، روزمرہ زندگی کے معمولات، مختلف افراد اور جگہوں سے متعلق امور کے بارے میں گفتگو۔ صرف اور قواعدِ صرف، فعل، اسم، ضمیر، اسم اشارہ، اسم موصول، صلات، جملہ: اسمیہ، فعلیہ، خبریہ، انشائیہ، جملوں کی دیگر اقسام، صرف ونحو 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 مجہول، صلات، جملہ شرطیہ، اسم اور ضمیر، اسم صفت، مذکر اور مؤنث صیغے، واحد، تثنیہ 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، دعوتِ وتبلیغ اور اہل مکہ کا ردِ عمل، ہجرتِ حبشہ، ہجرتِ مدینہ، شہری ریاست کا قیام، مؤاخاتِ مدینہ، میثاقِ 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 پیراگراف، مختصر کہانیاں، منتخب نثر اور نظم پارے مع گرامر اور عربی لغات۔

IS-105 Introduction to Logic تعارفِ منطق

منطق کا مفہوم، تصور اور تصدیق، منطق استقرائی اور استخراجی، 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 قائداعظم محمد علی جناح کیا فکار کی روشنی میں، دوقومی 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 چیلنجز، 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 وادب

عربی ادب کی کتب سے منتخب پیراگراف، مختصر کہانیاں، منتخب نثر اور نظم پارے مع گرامر اور عربی لغات۔

IS-201 Textual Study of Holy Quran-I مطالعہ متن قرآن-1

سورۃ 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 النبین، رسول اللہ کی عائلی زندگی کے حوالے سے مسلمانوں کے لیے احکام۔ متن آیات مع عربی لغات، گرامر، تفسیر و تاویل۔

آغاز، حجیتِ سنت: قرآن کی رو سے، نبی اکرم ﷺ کے چہارگانہ فرائض، عہدِ تدوین اور سنی مکاتب فکر کی مستند ترین کتب حدیث کا تعارف، صحاح ستہ اور شیعہ مکتبِ فکر کی کتبِ اربعہ کا تعارف۔

IS-205 Textual Study of Holy Quran-II — مطالعہ متن قرآن

سورۃ النور

بدکاری اور قذف کی سزا، واقعہ افک اور اس کی تفصیلات، حجاب اور سماجی تعلقات کا دائرہ کار، کائنات اور آیات الوہیت، 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 30.

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 جعفری مکاتب فقہ کا ظہور اور ان کے بانیان اور معروف فقہا 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 وارشاد

دعوت کا تعارف، دعوت کی اہمیت، داعی کے اوصاف، دعوت کے اصول، انبیاء کرام کی دعوت کے اسالیب، رسول اللہ ﷺ کی زندگی سے دعوت کے وسائل، دعوت اسلامی کے چیلینجز۔ 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 بالرائے۔ تفسیر بالماثور کی نمائندہ کتب، تفسیر بالرائے کی نمائندہ کتب، علم تفسیر کا ارتقا، تفسیری رجحانات (فقہی اسلوب، سائنسی

IS-202 Islamic History — تاریخ اسلام (خلافت راشدہ)

خلافتِ راشدہ۔ حضرت ابوبکر صدیق، خلافت کا آغاز، جھوٹے مدعیانِ نبوت، مانعینِ زکوۃ اور مرتدین کے خلاف کاروائی، عہد صدیقی کے کارہائے نمایاں، حضرت عمر فاروق کی جانشینی، فتوحات، داخلی نظم ونسق، امنِ عامہ، کفالتِ عامہ، عدالتی نظام، شوریٰ، حضرت عثمان کی خلافت، فتوحات، کارہائے نمایاں، فتنہ کے اسباب اور نتائج، حضرت علی کی خلافت، جنگِ جمل اور جنگِ صفین، واقعات ونتائج، حضرت علی کی سیرت وکردار۔

IS-203 Ulum-al-Quran — علوم قرآن

جمع وتدوین قرآن، مکی اور مدنی سورتوں کی خصوصیات، محکمات ومتشابہات، نسخ فی القرآن، تدریجی نزول، اسبابِ نزول، مضامینِ قرآن، تفسیر قرآن کے مآخذ ومصادر، مناہجِ 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، زکوۃ، 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 وشواہد کی اہمیت بنی اسرائیل، یہود ونصاری مشرکین اور منافقین کے عقائد اور سماجی رویے قرآنی آیات کی روشنی میں۔

IS-204 History and Compilation of Hadith — تاریخ تدوینِ حدیث

جمع وتدوینِ حدیث کے مختلف ذرائع، عہدِ نبوی میں، عہدِ صحابہ کرام میں، سرکاری دستاویزات، ذاتی مجموعے، عہدِ صحابہ کی دستاویزات، سلسلہ سند کا آغاز وارتقا، وضع حدیث کا فتنہ اور علم جرح وتعدیل کا

زرتشت ازم، سکھ مذہب، جین مذہب۔ سامی مذاہب: یہودیت، مسیحیت اور اسلام۔ مذکورہ مذاہب کے عقائد، تعلیمات، عبادات، مقدسات اور تہذیب اور روایات کا تقابلی مطالعہ۔

فقہ القرآن IS-305 Fiqh al-Quran

فقہ القرآن کا تعارف، قرآنی احکام: طہارت، نماز، روزہ، زکوۃ، حج، عائلی قوانین، میاں بیوی کے حقوق وفرائض، اولاد کے حقوق، یتامیٰ اور بیواؤں کے حقوق، قانونِ شہادت، قانونِ حلال وحرام، معاہدات، سماجی ذمہ داریاں، تجارت وسود، قانونِ جنایات، ریاست اور شہریوں کے حقوق اور بین الاقوامی تعلقات۔

علوم الحدیث IS-311 Ulum-al-Hadith

علوم الحدیث کا تعارف، حدیث کی اقسام، اصول حدیث، روایت حدیث کے اصول وضوابط، سند کے اعتبار سے حدیث کی اقسام، متن کے اعتبار سے حدیث کی اقسام، صحت کے اعتبار سے حدیث کی اقسام، درایت حدیث کے اصول، تحمل حدیث کے طرق، طبقات رواۃ حدیث، علوم الحدیث کی انواع، علم جرح وتعدیل، علم مختلف الحدیث، علم اسماء الرجال، علل حدیث، غریب الحدیث، ناسخ و منسوخ، کتب حدیث کی اقسام، علم حدیث کے دوسرے علوم پر اثرات۔

تحقیق نگاری IS-306 Research Writing

اسلام میں تحقیق کے اصول ومبادی: روایت ودرایت اور ان کی تطبیق، تفسیر، حدیث، فقہ، اصولِ فقہ، تاریخ اور دیگر اسلامی علوم میں ریسرچ کا طریقہ کار: لائبریری ریسرچ، سروے، لیبارٹری ریسرچ، موضوع کا انتخاب، خاکہ کی تیاری، مواد جمع کرنے کا طریقہ، مواد کی جانچ پڑتال، علمی تحقیق نگاری، نیز تحقیق کے سوال، مشاہدہ اور تجربہ سے لیکر مقالہ کے دفاع تک کی تربیت

مسلم عائلی قوانین IS-307 Muslim Family Laws

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 ونفقہ، قرآن کا قانونِ میراث، یتامیٰ کی وراثت، یتیم اسلوب، فلسفیانہ اسلوب، ادبی و بلاغی، اسلوب اشاری اسلوب، دعوتی تفسیر، اجتماعی تفسیر، کلامی تفسیر، الحادی و باطنی تفسیر، موضوعی تفسیر) فراہی مکتب فکر، برصغیر میں حنفی مکتب فکر کے نامور مفسرین، سید مودودی، پیر کرم شاہ ازہری اور علامہ غلام رسول سعیدی کی خدمات۔

مطالعہ متن قرآن-3 IS-301 Textual Study of Quran III

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 ومسیح، معجزات مسیح، یہود کا کردار، بیت اللہ کی اولیت، متن آیات مع عربی لغات، گرامر، تفسیر وتاویل کے حوالے سے۔

مطالعہ متنِ حدیث IS-302 Textual Study of Hadith

موطا امام مالک، کتاب الصوم وکتاب الزکوۃ۔ 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 الزکوۃ: نصاب زکوۃ، مستحقین زکوۃ، اموال کی اقسام اور ہر ایک کا نصاب زکوۃ، مشترک مال کی زکوۃ، زکوۃ وعشر سے مستثنیٰ اشیاء، جزیہ اور ٹیکس، صدقہ فطر۔ مؤطا امام مالک کے متن کی روشنی میں۔

جدید دنیائے اسلام اور تحریکات IS-303 Contemporary Muslim World & Movements

مسلم ریاستوں کا جغرافیائی محلِ 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۔

مذاہب عالم کا تعارفی مطالعہ IS-304 Introduction to world Religions

مذہب کی ضرورت واہمیت، مذہب کا آغاز، سامی وغیر سامی مذاہب۔ ہندو دھرم: بدھ مت،

IS-310 Study of Islamic Fiqh(Al-Ibadaat)

مطالعہ فقہ (عبادات)

مختصر القدوری کی کتاب الطھارت اور کتاب الصلاۃ کا مطالعہ

مسائل طہارت: طہارت کی اقسام، نواقض طہارت، اوقاتِ صلاۃ، اذان، نمازوں کی اقسام، فرائض و واجبات اور نوافل، شرائطِ صلاۃ، ارکانِ صلاۃ، مفسداتِ صلاۃ، نمازوں کی اقسام: نمازِ استسقاء، نمازِ کسوف وخسوف، نمازِ 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 االاقوامی 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 واہمیت، مذاہب کے درمیان اختلافات اور مکالمہ کی تاریخ، مختلف مذاہب میں مشترکات ومختلفات، مکالمہ کے اصول وضوابط، مکالمہ بین المذاہب کی قرآنی اساسیات اور مختلف مذاہب پر اس کا اطلاق، اسلام اور سامی مذاہب کے درمیان مکالمہ، اسلام اور غیر سامی 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، توحیدِ خداوندی، توحید ذات وصفات، نبوت، معجزات، آخرت، قضاء وقدر، اشاعرہ، ماتریدیہ اور معتزلہ کے عقائد کا تقابلی مطالعہ، الحاد اور اس کے اسباب وعلاج۔

پوتے کی وراثت اور مسلم فیملی لاز کا تنقیدی مطالعہ۔

IS-401 Islamic Law of Inheritance — اسلام کا قانونِ وراثت

اسلام میں میراث کا تصور اور اس کا دائرہ کار، قرآنی ورثاء 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، تخلیقِ 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، تخلیقِ حیات اور تخلیقِ آدم، انسانی افکار، اعمال اور اقوال کی ریکارڈنگ، سائنس اور قرآن کی روشنی میں امکانِ قیامت۔

IS-403 Economic system of Islam — اسلام کا اقتصادی نظام

اسلام کا فلسفہ تقسیم دولت، اسلام کا تصور حلال وحرام، اسلام کا تصور وراثت و وصیت، اسلام کا فلسفہ کفالت، اسلام کا فلسفہ نفقات خاصہ، صنعت وتجارت، 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 وقضا 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 — اصولِ فقہ اسلامی

فقہ اسلامی کے اصول کتاب اللہ اور سنت نبوی میں، عہد نبوی اور خلافتِ راشدہ میں اجتہاد اور اس کے اساسیات، فقہ حنفی کے اصول وکلیات، امام شافعی کی کتاب الرسالہ، ابتدائی صدیوں کے مجتہدین کے فقہی اصول کا موازنہ، اصولِ فقہ میں کتاب، سنت، اجماع، قیاس اور دیگر مستدلات کا تعارف اور تطبیق، تقلید اور اس کے اثرات، دورِ جدید میں ضرورت اجتہاد اور اس کا دائرہ ءکار۔

IS- 404 Research Project

IS-405 Islamic Spirituality — اسلامی تصوف واخلاق

باطنی پاکیزگی کا تصور، احسان وتزکیہ کا مفہوم، اسلامی اخلاق کی اساسیات، اسلامی اخلاق کے مقاصد، فضائلِ اخلاق کا محرک، رذائلِ اخلاق سے پاکی کے طریقے، حُسنِ نیت، اخلاص، تقویٰ، رضائے الٰہی، خالق اور اس کی مخلوق سے محبت اور صبر وشکر۔

IS-406 Gender studies and Human Rights — مطالعہ جنسی امتیاز اور حقوق انسانی

اسلام میں خواتین کا مقام، قرآن وسنت 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، حاکمیتِ الٰہی، 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، کفالتِ 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 سماج پر ان کے اثرات، برصغیر کے نامور مسلم سکالرز 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 معاہدات 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 ارتقا، 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 آخری 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

DIRECTORATE OF QUALITY ASSURANCE & COLLABORATIONS (QA&C)

Dr. Ejaz Muhammad

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.

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:-

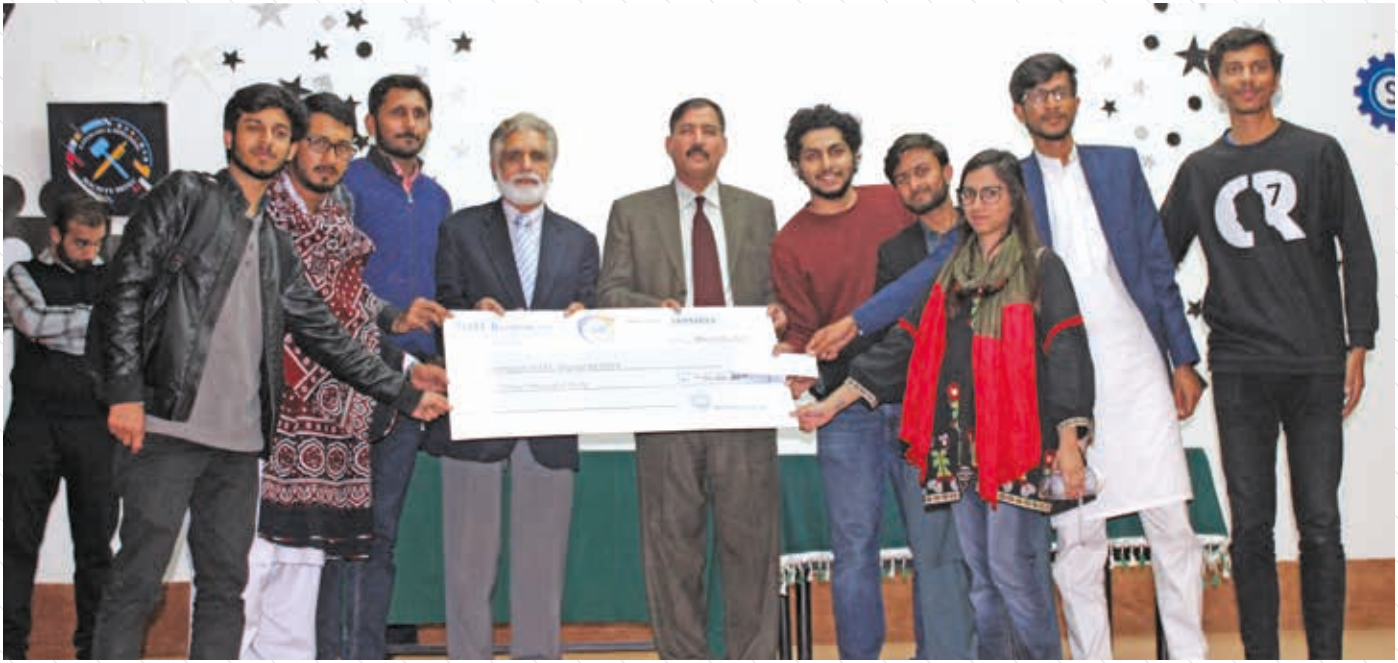
- PLO-1 Engineering Knowledge
- PLO-2 Problem Analysis
- PLO-3 Design / Development of Solutions
- PLO-4 Investigation
- PLO-5 Modern Tool Usage
- PLO-6 The Engineer and Society
- PLO-7 Environment and sustainability
- PLO-8 Ethics
- PLO-9 Individual and Team Work
- PLO-10 Communication
- PLO-11 Project 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. Admission Test is applicable to candidates of undergraduate programs only.

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 in Electrical / Telecommunication / Electronics / Avionics / Instrumentation / Information Technology / Precision Mechanical and Instrument / Radar Technology / Automation / Radio Technology / Instrumentation and Process Control.
- Minimum 60 % marks.

BS (Mechanical Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry and Mathematics or
- Diploma of Associate Engineers in Mechanical / Mechanical (Power) / Mechanical (Production) / Precision Mechanical and Instruments / Auto and Diesel Tech / Bio-Medical / Dies and Mould / Automation / Refrigeration and Air Conditioning / Mechanical (Construction Machinery).
- Minimum 60 % marks.

BS (Computer Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry / Computer Science and Mathematics.
- Diploma of Associate Engineers in Computer Information Tech / Computer / Telecommunication / Electrical / Electronics / Software / Radar Technology / Automation / Radio Technology / Instrumentation / Instrumentation and Process Control.
- Minimum 60 % marks.

BS (Civil Engineering)

- F Sc/A Level or equivalent with Physics, Chemistry and Mathematics.
- Diploma of Associate Engineers in Civil / Geo Informatics/ Land & Mine Surveying / Environmental / Architecture Technology.
- Minimum 60 % marks.

BS (Computer Sciences)

- Intermediate / equivalent with Mathematics, Chemistry/ Computer Sciences and Physics.
- Minimum 50 % marks.

BS (Mathematics)

- Intermediate / equivalent with Mathematics with minimum 50 % marks.
- Diploma of Associate Engineers with minimum 60% marks.

BS (Islamic Studies)

- Intermediate / equivalent / Khassa Certificate recognized by HEC.
- Minimum 45 % 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. Students with valid NAT IE/ICS/IGS and HEC, HAT results 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%

Mathematics

English	22%
Analytical	22%
Quantitative (Arithmetic, Algebra & Geometry)	22%
Subject (Physics, Mathematics, & Chemistry)	34%
OR	
Subject (Mathematics, Statistics & Economics)	34%

Determination of Merit

The final merit will be determined based on:-

University Admission Test	40%
HSSC Part 1/HSSC or equivalent	50%
SSC / O-level	10%

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	June 10, 2019	Monday
Last Date of Submission of Admission Form	July 09, 2019	Tuesday
Admission Test	July 13, 2019	Saturday
First Merit List	July 18, 2019	Thursday
Deposit of Dues /Registration of Students	July 19-25, 2019	Friday-Thursday
2nd Merit List	July 25, 2019	Thursday
Deposit of Dues /Registration of Students	July 26-31, 2019	Friday-Wednesday
Third Merit List (If required)	August 01, 2019	Thursday
Commencement of Fall Semester 2019	September 16, 2019	Monday
Orientation	September 16, 2019	Monday

Contacts

Muhammad Hafeez
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

Mrs. Nabila Shuja

MSc, M.B.A, DIABP, MCP, MCSE+I, MCDBA, CCNA.
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 the Board.

Fee Structure

The fee structure for the student registered in the academic year 2019-20 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. 10,000/-	Rs. 10,000/-	Rs. 40,000/-
BS Islamic Studies	Rs. 9,000/-	Rs. 5,000/-	Rs. 25,000/-
MS Engineering	Rs. 10,000/-	Rs. 10,000/-	Rs. 6,500/- per cr hr
MS Mathematics	Rs. 10,000/-	Rs. 10,000/-	Rs. 6,500/- per cr hr
MS Computer Sciences	Rs. 10,000/-	Ra. 10,000/-	Rs. 6,500/- per cr hr
MS Islamic Studies	Rs. 9,000/-	Rs. 5,000/-	Rs. 4,000/- per cr hr
PhD	Rs. 10,000/-	Rs. 10,000/-	Free

Tax will be applicable on the Fee as per government rules

Note:-Semester fee includes tuition fee, examination fee, lab charges, sports subscription etc.

Payment of Dues

1. For the convenience of students the University has set up a permanent banking booth at the University campus, by the Bank Alfalah Limited for the cash deposit of fee.
2. The fee challan will be downloaded by the students by logging into their user ID i.e. their e-mail address.
3. The students can deposit fee online through all domestic branches of Bank Alfalah Limited as per following details:
   i. For new admission/ registration in HITEC University fee should be deposited to Bank Account # 0205-1002544145, Title "HITEC UNIVERSITY, TAXILA CANTT".
   ii. The student is responsible for submission of online fee deposit slip/challan to Accounts Office to confirm his/her admission/registration.
4. The fee can be deposited through Bank Draft drawn in favour of Bank Account # 0205-1002544145 Title "HITEC UNIVERSITY, TAXILA CANTT".
5. All registered students of the University should deposit their semester fee within 10 working days of the commencement of classes of that semester, thereafter fine will be charged as per University policy. They should download the fee challan by logging into HITEC MIS through their user ID.

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 7th day of commencement of Classes	Full (100%) Fee Refund
From 8th-15th day of commencement of Classes	Half (50%) Fee Refund
From 16th day of commencement of Classes	No Fee (0%) Fee Refund
Postgraduate Program	
Up to 14th day after Commencement of Classes	Full (100%) Fee Refund
After 14th Day of Commencement of Classes	No (0%) Fee Refund
• **%age of Fee** shall be applicable on all components of fee, except for security and admission charges	
• **Timeline** shall be calculated continuously, covering both weekdays and weekends	

Fine for Late Payment of Fee For enrolled students

The following fines will be levied for payment of fee after due date:

- For the first ten days after due date, 5% of the payable amount.
- After ten days up to twenty days, 10% of the payable amount.
- After twenty days Rs. 10,000/- will be charged.
- Two months after due date, Registration shall be suspended.
- For re-activation of registration, the student will be required to pay the admission charges again, with all outstanding charges and fine.

Financial Assistance/Scholarship

The HITEC University allocates substantial amount of scholarship and financial assistance to the deserving students as per policy below:

Description	Remarks
1st Semester Merit List Positions	50% tuition fee waiver for 1st 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
TFP Scholarship	Awarded on performance basis to deserving students
Qarz-e-Hasna Scheme	Available to eligible candidates in collaboration with "Ihsan Trust of Meezan Bank"

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. 10,000/-
Per Semester (non refundable)	Rs. 35,000/-

Transport

Transport facility is available for Islamabad & Rawalpindi areas only on first come first serve basis. Transport charges are,

Per Semester Charges (non-refundable)	Rs. 20,000/-

Miscellaneous Charges

Course Repeat Fee	Rs. 6,500/- per cr hr
Semester Freeze Fee	25% of the each semester Fee (undergrads) Rs. 10,000.00 per semester (MS) Rs. 6,000.00 Per semester (PhD)
Migration Fee	Rs. 25,000/- each exempted semester
Transcript Fee/ Semester	Rs. 300/- Normal (7 days) & Rs. 600/- Urgent (3 days)
Degree Fee (Before Convocation)	Rs. 3000/- 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.1500/- Local , Rs.5,000/- Overseas
Convocation Charges	Rs. 8,000/- (will be deducted from the security refund)

Contacts

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Academic Regulations (Common to all)

Lt Col (R) Mahmood Ahmed Siddiqui, TI (M)
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 and makes semester grade reports available to students on University website. The Office also maintains over all examination records of the students and 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 and 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 a 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 2019-2020 is:-

Fall Semester 2019	16 Sep 2019 - 24 Jan 2020
Spring Semester 2020	10 Feb 2020 - 19 Jun 2020
Summer Semester 2020	22 Jun 2020 - 28 Aug 2020

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.

$$\text{CGPA} = \frac{\text{Sum of (PxN)}}{\text{Sum of N}}$$

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.

$$\text{GPA} = \frac{\text{Sum of (PxN) of a semester}}{\text{Sum of 'N' of that semester}}$$

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 willbe 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 nineteen credit hours for undergraduate, 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 relegated or 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 academic, 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 under any of the following conditions, if:-

- First semester GPA is equal to or more than 0.75 but below 2.00.
- CGPA at the end of second semester is equal to or more than 1.50 but below 2.00.
- CGPA in third or subsequent semesters is below 2.00 but does not qualify for relegation
- Fails in a course(s).

Relegation

A student is relegated under any of the following conditions:-

- The second semester CGPA is equal to or more than 1.25 but below 1.50.
- From third and in subsequent semesters, obtains CGPA less than 2.00 in two consecutive regular semesters.
- On medical or disciplinary grounds
- Own request

Note: Relegation on medical grounds will not be counted towards withdrawal.

Withdrawal

A student is withdrawn from the University subject to any of the conditions listed below:-

- At the end of the first semester, obtains GPA below 0.75.
- At the end of first two semesters secures CGPA below 1.25.
- Earns relegation after being placed on relegation twice except as provided in the rules.
- On disciplinary ground or using unfair means in the examination.

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.

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;
- First semester GPA is less than 2.00;
- 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; and
- 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; or
  - 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.

- **Policy.** Board of Faculty shall recommend a student for withdrawal, under any of the following conditions if the:-
  - First semester GPA is below 2.00; or
  - Fails more than once in course work; or
  - 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.

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 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 these rules.

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 3 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 "X" or "W" 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 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.

External Examiner for 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 two 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 blood relation or his spouse or the faculty member is a candidate himself.
- External examiners may not be co-author of any publication with the candidate or his spouse or his blood relative or supervisor.

Contacts

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Student Affairs

Huma Fawad
Director Student Affairs,
PhD (in progress) UET Taxila,
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 aims to cultivate and enhance students potential in sports, literature, music, culture, arts, social entrepreneurship and community development program. The office maintains a close liaison with various industries and organizations for student projects, industrial visits, placement and internship program beside arranging Inter University Events (Olympiad), Open House, Job Fair, Industrial Visits, Excursion Trips, etc.

Hostel

A fully functional purpose built hostel facility is available at the campus to accommodate three 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 sport potential to the full. The lush green premises also aims 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.

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.

Mini Auditorium Complex

An excellent state of the art facility has been established for holding of Conference and Seminars with a 200 seating capacity auditorium, conference room and a dining room to be used for events and on regular basis as faculty dining area.

Cafeteria

Currently two cafeterias are operational in the University Campus 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 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 department during scholarship processing for need-cum-merit based scholarships. These programs are funded either by the University's internal sources or by various organizations to HITEC students. Currently the Scholarships cover a range of programs from Razia Sultana Scholarship, University Financial Assistance Program, Abdul Mateen Ansari Scholarship, etc.

In each semester, University allocates and distributes a large amount of financial assistance to help needy students. During Fall Semester 2018 & Spring Semester 2019 Rs. 5.65 Million was distributed amongst deserving students on need cum merit basis. In addition to that, all Huffaz students are entitled to receive stipend of Rs. 1000/- per month.

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.

Marketing & Media Cell

This recently established cell is to support the functioning of the University by maintaining effective liaison with the prospective students in dispersing information about the University, its programs, its achievements through print, electronic and social media sites etc. Two way visits and collaboration with schools, colleges and prospective University students is the main responsibility of the 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 heals 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 are given below during session Fall 2018 and Spring 2019.

Declamation Contests at SZABIST, Islamabad

Syed Jarar Haider Naqvi, student of HITEC University participated in "Speak for Jinnah competition" at Shaheed Zulfiqar Ali Bhutto Institute of Science & Technology, Islamabad and secured first position.

Declamation Contests at different Forums

Syed Jarar Haider Naqvi, student of HITEC University participated in declamation contests on different forums and was declared winner in the following events:

- "All Punjab Sultan Bahu Declamation Contest 2018" at Government College University, Jhang.
- "Best Urdu Speaker, NAB Declamation Contest 2018" at NAB Islamabad Headquarter from November 19 – November 20, 2018.
- "Speech Competition" in Wah Educational Expo'18 at University of Wah, Wah Cantt on December 19 ,2018.

2nd All Pakistan Declamation Contest 2018 at Air University

Syed Jarar Haider Naqvi, student of HITEC University declared as Best Ambassador for "All Pakistan Declamation Contest 2018 at Air University, Islamabad.

PSYWSC'18 at PIEAS Islamabad

Muhammad Asad Anwar, student of HITEC University participated in "All Pakistan IEEE Student Congress 2018 (PSYWSC'18)" organized by PIEAS, Islamabad from November 3- November 4, 2018 and secured 1st position in "YP TISP Session".

IMEC'19 at GIKI

A team of HITONIAN comprising of Ahmed Faraz Nawaz and Hamza Nawaz took part in "International Mechanical Engineering Convention 2019 (IMEC'19)" arranged by GIKI from February 8th – February 10th 2019 and secured 1st position in "Scavenger Hunt".

EME Olympiad'19 at NUST College of EME, Rawalpindi

NUST College of EME organized a mega event named "EME Olympiad'19" from February 28th – March 2nd, 2019. Universities and colleges from all over the country participated in the event. HITONIANS marked their presence by winning series of events in the following categories.

- Syed Jarar Haider Naqvi declared as winner of "Declamation Contest".
- Uzair Ahmed stood first in "Snooker".
- Osama Bin Ahmed won "Tekken".
- Malik Muzammil stood first in "Egg Drop Competition" & "Integration Bee" competitions.
- Farhan Irfan won the event / module of "Minute to Win It".

- Team comprising of Uzair Ahmed and Farhan Irfan have secured 1st position in "Crime Scene Investigation".
- Team consisting of Osama Bin Ahmed and Malik Muzammil stood first in "Bridge Building".
- Muhammad Usman has also won the events of "Theme Photography" and "Logo Designing".

TECHFEST & RENAISSANCE'19 at GIKI

GIKI organized a mega event by the name of TECHFEST & RENAISSANCE'19 from March 29th – March 31st 2019. Students of HITEC University participated and stood first in different modules.

- Bilal Tariq won "3D Modeling"
- Team consisting of Azhar Abbas, Muhammad Mubashar and Bilal Tariq stood first in "The Rorshach Dilemma".
- Team of Wajhat Iqbal and Muhammad Ahsan stood first in "Speed Coding".
- Team comprising of Bilal Tariq, Muhammad Mubashar and Syed Fahad Wasim stood first in "Is Construction of Dams the only way Forward?".

- Team consisting of Muhammad Imran Haider, Wajahat Iqbal and Muhammad Ahsan won “Medium Independent Power Transmission” module.

IST Youth Carnival’19 at IST, Islamabad

Institute of Space Technology (IST) organized a mega event named “IST Youth Carnival’19” from March 28th – March 30th, 2019. More than 50 universities and about 1500 participants from all over the country participated in the event. HITONIANS marked their presence by winning series of events in the following categories.

- Muhammad Usman won “On-Spot Fast Film”.
- Junaid Iqbal declared as winner of “Wind Mill Challenge”.
- Team consisting of Malik Muzammil, Usama Bin Ahmed, Farhan Irfan and Muhmmad Uzair stood first in “Gravity Vehicle Competition”.
- Muhammad Usman stood first in “Short Film Competition”.
- Zain Bin Qaiser declared as winner of “Singing Competition”.

Air Nexus’19 at Air University, Islamabad

Teams of Students of HITEC University took part in mega event name “Air Nexus’19” organized by Air University, Islamabad from April 5th – April 7th, 2019 and HITEC University was declared as Champion University. Details are as under:-

- Saud Ali Khan won the competition of “Wall Graffiti”.
- Team consisting of Sharjeel Ahmed and Usama Baloch secured 1st position in “Bait Bazi”.
- Miraj Ali also secured 1st position in “Call of Duty”.

FUUAST Innovatia’19 at FUUAST, Islamabad

Federal Urdu University of Arts, Science & Technology (FUUAST), Islamabad organized a mega event name

“FUUAST Innovatia’19” from April 19th – April 21st, 2019. More than 40 universities from all over the country participated in the event. Students of HITEC University won series of events in the following categories and HITEC University was declared as runner up for Champion University.

- Team comprising of Sharjeel Ahmed, Talat Mobeen, Musawar Mehdi, Asad Khan, Bilal Hussain, Mariyam Yaseen and Mahnoor standing first in “Drama Competition”.
- Team consisting of Bilal Hussain, Saadat Ali and Asad Khan won the “Project Exhibition”.
- Sharjeel Ahmed won “Bait Bazi” of FUUAST Innovatia’19 and also stood first in “Poetry”.
- Team of Saadat Ali and Malik Muzammil declared as winner of “Need for Speed”.
- Muhammad Usman won the competitions of “Photography (Portrait)” and “Photography (Landscape)”.
- Asad Khan stood first in “Videography” and “Egg Drop

Competition".

- Yasir Khan declared as winner of "Knockout Warrior".
- Malik Muzammil won the series of modules of "TechnoBuzz", "PUBG" and "Bridge Making".
- Kashif Ijaz also stood first in "Scavenger Hunt".

Sports Week'19 at UET, Taxila

Teams of Students of HITEC University took part in "Sports Week'19" organized by University of Engineering & Technology (UET), Taxila from April 26th – April 27th, 2019. The "Futsal" team of HITEC University secured 1st position out of 20 teams.

UW / WEC Magnovita'19 at University of Wah and Wah Engineering College, Wah Cantt

University of Wah (UW) and Wah Engineering College (WEC) Wah Cantt organized a mega event name "Magnovita'19" from April 26th – April 27th, 2019. Students of HITEC University won series of events in the following categories.

- Team comprising of Asad Khan, Bilal Hussain, and Muhammad Asad Anwar standing first in "Scavenger Hunt".
- Team consisting of Bilal Hussain, Junaid Iqbal and Asad Khan won the technical events of "Scrap Tech" and "Water Rocket".
- Asad Khan stood first in "Egg Drop Competition".
- Team of Muhammad Hamza, Bilal Hussain, Abdul Hadi and Zaid declared as winner of "Line Following".
- Muhammad Usman won the competitions of "Poster Designing" and "Design IT (Autocad)".
- Muhammad Hamza won the both competitions of "Photography (Portrait & Landscape)".
- Abdur Rehman also stood first in "100M Race".
- Team comprising of Malik Muzzamil Haider, Usama Bin Ahmed and Asad Khan standing first in the series of modules of "Stick Bridge", "Eifle Tower" and "Paper Plane".

HITEC Olympiad'19

"HITEC Olympiad 19", an Inter University competition organized annually by HITEC University was held from March 14th – 16th, 2019. Around 45 different universities and colleges participated in 55 different events from sports like cricket, futsal, badminton, table tennis, chess to qiraat, naat, declamations, drama, singing, videography, sketching, photography, speed wiring, speed programming, entrepreneurial project competition and e-gamming, etc.

The Olympiad was inaugurated by Lieutenant General Abdullah Dogar, Chairman Board of Governors, 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. Professor Dr. Muhammad Younas Javed, Vice Chancellor, HITEC University, 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

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Information Technology Services (ITS)

Engr. Fawad Salam Khan

Manager Information Technology
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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 though video conferencing.

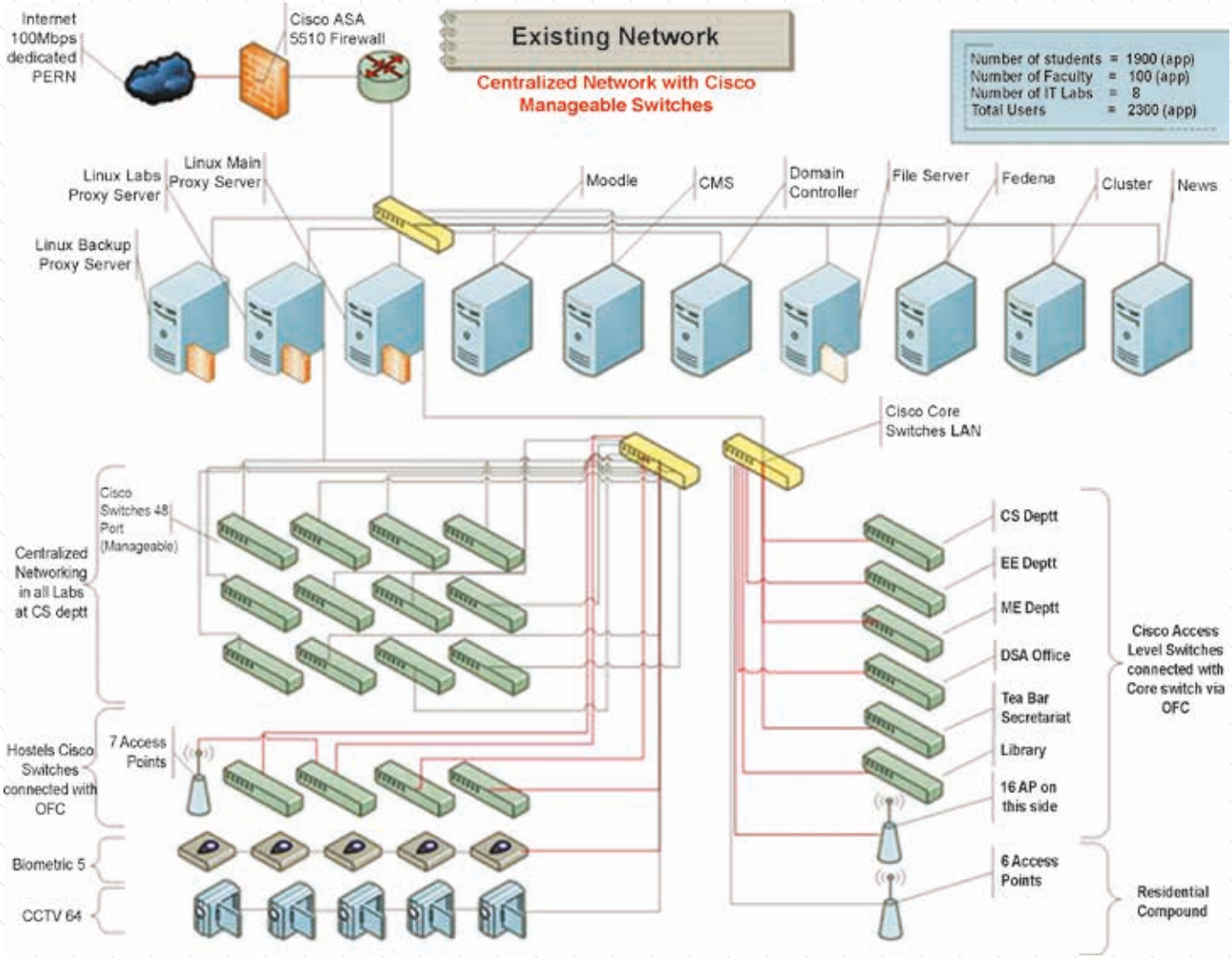
Data Center

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 one 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.

Olympiad 2019

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
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Website : https://hitecuni.edu.pk

Prospectus Title designed by Mr. Muhammad Abdullah, student of HITEC University