HITEC UNIVERSITY

Taxila Cantt

SELF ASSESSMENT REPORT

BS Mechanical Engineering
Faculty of Engineering and Technology

Heavy Industries Taxila Education City (HITEC) University

May 2023

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Reviewed by:	**QEC, Chairman, Dean, Vice-Chancellor**
Endorsed by:	**Chairman, Dean, Vice-Chancellor**

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Executive Summary

This self-assessment report is being prepared for BS Mechanical Engineering from the Department of Mechanical Engineering as prescribed by Higher Education Commission. Quality Enhancement Cell was formed in HITEC University in 2011. Program Team and Assessment Team of mechanical engineering department were formulated by University to collaborate with QEC to accomplish the following report in line with HEC guidelines with the support of Vice Chancellor and Department Heads.

This self-assessment report provides an analysis and evaluation of the academic standards followed and implemented by BS Mechanical Engineering Program. HEC prescribed Self-Assessment Manual is used as a reference and he program is being evaluated based on 8 criteria and 31 standards of quality improvement. First Program teams of Mechanical Department made the report and then further assessed by the assessment team. The report finds the prospects of maintaining and continually enhancing academic standards and student's learning.

This report also investigates the strong and weak areas and other improvements needed by the department. A feedback is then provided in the form of corrective actions and implementation plan for quality assurance and improvement of academic programs in the future.

Objectives

- To document the entire program into one report for the purpose of accountability, quality enhancement and accreditation.
- To make aware all the stake-holders their rights and duties as per the Self-Assessment Manual.
- To be eligible for HEC funding proportionate to our ranking.
- To be a preference for HEC scholarships for students and faculty.
- To be eligible for evaluation by external evaluators

Execution

The hierarchy of the execution tree was fundamental to the efficient working of all the stake-holders. Formulation of PT and AT was the very first step towards the goal.

Self-Assessment Manual was distributed to all the faculty members for awareness and especially to the Program and Assessment Teams for SAR. Lectures and workshops were arranged for senior faculty members along with the Registrar, Treasurer, Controller of Examination, Deans and Vice-Chancellor where qualified professionals of their fields taught the role of Quality and Accountability in education and especially in Higher Education.

The senior faculty members then became mentors for the junior faculty members and the knowledge of the subject spread to each and every faculty member along with supporting individuals/groups, until all were on the same page.

Following the lecturing and mentoring, a task distribution seminar was arranged by the chair of the Program Team. In this seminar, 8 criteria with 31 standards in total were distributed as tasks to various faculty members. An internal deadline of one month was given to all the task holders.

All task holders were instructed on the procedure of procurement of information for the completion of tasks. The information from various concerned departments of the university was to be obtained in written form along with initials of the information provider.

Once the criteria were ready, the task holder sent the soft copy for review and proof reading to the chair of the Program Team. The chair reviewed and proof read in company with the Quality Representative of the respective Department. Once all the corrections and revisions were done in line with the Self-Assessment Manual, the task holders sent a signed hard copy and a soft copy to the chair of the Program Team who then incorporated the finished criteria into a single report and the report was given a draft shape.

This draft was then sent as a soft copy and as a hard copy to the Quality Enhancement Cell, Chairman Mechanical Engineering Department, Dean and Vice-Chancellor who gave their valuable inputs.

Once the draft was finalized, QEC arranged for the Self-Assessment Report of the BS Mechanical Engineering Program to be assessed by the Assessment Team in the first week of June 2023.

The findings of the Assessment Team (AT) are given in the annexure-J. It outlines the improvements required in the infrastructure, syllabi and training of the faculty and support staff. The implementation plan (annexure-K) was prepared after discussion

with all the stake-holders and it indicates the resources required to improve the Quality. Responsible bodies, timelines and goals were set for the execution of the implementation plan.

Self-Assessment Report

Introduction

Heavy Industries Taxila Education City (HITEC) University is a private sector university. It was established in 2007 and chartered in 2009 by the Government of Punjab. The University is sponsored by Heavy Industries Taxila Education Welfare Trust (HITEWT). The university was established with a vision to produce skilled, moral, ethical and patriotic professionals who can serve the society and who will be guardians of national, social and religious values.

University Mission Statement

HITEC University will be a center of excellence in teaching, learning and research. We shall instill and inspire intellectual curiosity, lifelong quest of 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.

Department of Mechanical Engineering

Department of Mechanical Engineering has been one of the core departments since the inception of HITEC University in 2007. The Department imparts quality education through its highly motivated and qualified faculty graduated from leading national and international universities. Mechanical engineering is one of the broadest and most sought-after engineering disciplines. It is the innovative application of science and technology to the design, production and operation of mechanical devices, machinery, and systems. It mixes core traditional engineering principles with emerging technologies to create truly innovative solutions to design problems.

The first batch of mechanical engineering graduated in 2011. Till 2017, ten batches, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, and 2018 have graduated from the university. Batches 2007, 2008, 2009, 2010 and 2011 are recognized under PEC accreditation level I. Batches 2012, 2013, 2014, 2015 2016, 2017, and 2018 are recognized under PEC OBE accreditation level II.

Program Selected

HITEC University has selected the **BS Mechanical Engineering Program** as first model program for Self-Assessment Report (SAR) under the directives of Higher Education Commission (HEC). The selected program has been accredited by Pakistan Engineering Council (PEC) since 2008.

Program Evaluation

The program is being evaluated based on 8 criterion and 31 standards as given in the Self-Assessment Manual provided by Higher Education Commission (HEC).

Criterion 1: Program Mission, Objectives and Outcomes

Standard 1-1 The program must have documented measurable objectives that support institution mission statements.

Program Mission Statement

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

Program Objectives

The program is designed to achieve the following objectives:

1. Our graduates will be proficient engineers in industry, academia or manage self-initiated business activity.
2. They will exhibit adaptation to advancements in knowledge for creating solutions of complex problems.
3. They will contribute as effective team members and managers in their organizations.
4. In dealing with others, they will conduct with dignity, integrity and demonstrate commitment to social responsibilities.

Alignment of Program Objectives with Mission Statements

Program objectives are not mere play of words; rather they guide and mould the curriculum to impart the right knowledge to the students so that the objectives are met.

Main Elements of Strategic Plan

Curriculum Design

Curriculum of BS Mechanical Engineering is carefully designed for a four year (eight semesters) degree program, fully adhering to the Higher Education Commission and Pakistan Engineering Council's guidelines and requirements. It is a broad-based scheme and the curriculum, which culminates with a final year capstone project, gives students a background that is essential to an engineering career or expanded further by more advanced education. The students learn about Materials, Solid and Fluid Mechanics, Thermodynamics, Heat and Mass Transfer, Theory of Machines, Mechanical Vibrations, Control, Instrumentation, Design, and Manufacturing of Mechanical Systems etc.

Practical Work

Practical training on state of the art equipment in state of the art laboratories in BS Mechanical Engineering Program is extensive and intensive. The wholesome practical work compliments the taught courses in their breadths and depths.

Projects

During the course of program, every student is required and encouraged to take up semester projects to “learn by doing”. The program culminates with a final year capstone project.

Internships/Industrial Tours/Visual Demonstrations

HITEC University is blessed to have been surrounded by nation’s finest industries. Directorate of Student Affairs arranges the internships for students at marked stages during the execution of program. HITEC University takes pride in some of the best internship opportunities for students of Mechanical Engineering.

Program Objectives Assessment

Objective	How Measured	When Measured	Improvement Identified	Improvement Made
1	Employer Survey / Alumni Survey	One in academic Year	Need to improve problem solving skills	Open Ended Complex engineering problems are introduced
2	Employer Survey / Alumni Survey	One in academic Year	More focus on new knowledge in the relevant field	Practical Projects has been introduced
3	Employer Survey / Alumni Survey	One in academic Year	NONE	NONE
4	Employer Survey / Alumni Survey	One in academic Year	NONE	NONE

Table 1: Program Objectives Assessment

Alumni (Batch 2018) and Employer Surveys were conducted to get their feedback. See Annexure A for cumulative results of Alumni Survey and See Annexure B for cumulative results of Employer Survey under different feedback categories.

Standard 1-2 The program must have documented outcomes for graduating students. It must be demonstrated that the outcome support the program objectives and that graduating students are capable of performing these outcomes.

Program Outcomes

The MED BS Mechanical Engineering Program outcomes have been adopted from Washington Accord Outcome Based Education (OBE System) since the program is accredited under OBE Accreditation Level-II. These objectives are as follows.

i. **Engineering Knowledge**

An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

ii. **Problem Analysis**

An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

iii. **Design/Development of Solutions**

An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

iv. **Investigation**

An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and fusion of information to derive valid conclusions.

v. **Modern Tool Usage**

An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.

vi. **The Engineer and Society**

An ability to apply reasoning and contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solution to complex engineering problems.

vii. **Environment and Sustainability**

An ability to understand the impact of professional engineering solutions in societal and environmental contexts and to demonstrate the need for sustainable development.

viii. **Ethics**

Apply ethical principles and commit to professional ethics and responsibilities and norms of sound engineering practices.

ix. **Individual and Teamwork**

An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

x. **Communication**

An ability to communicate effectively, orally as well as in writing, on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

xi. Project Management

An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

xii. Lifelong Learning

An ability to recognize importance of and pursue lifelong learning in the broader context of innovation and technological developments.

Program Objectives	Program Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	x											
2		x	x	x	x							x
3									x	x	x	
4						x	x	x				

Table 2 : Outcomes versus Objectives

Standard 1-3 The results of Program's assessment and the extent to which they are used to improve the program must be documented.

The program assessment has been done by students evaluating the courses and the respective teachers as per the HEC Performa.

Course & Teachers Evaluation

Course and Teacher's evaluation for fall semester 2022 is shown in the following graphical chart:

MECHANICAL ENGINEERING

Ammar Akram / Thermodynamics-I

Variables	Evaluation
Satisfied with Online Teaching by the Teacher	3.43
The teachers use of technology is adequate	4.07
The teacher uploaded online lectures and relevant material (audio, video, PPT/PDF) on weekly basis.	3.50
The teacher was available for online consultation during the week at specific timings	3.79
The teacher takes online assignments and quizzes regularly	4.36
The teacher returned all marked quizzes, assignments, and sessional exam on time.	3.86
The teacher provide timely and constructive feedback on your performance regularly	3.64
The teacher maintained liaison/link with you to address your queries related to the teaching material	3.64
How much you properly understand the lectures given/taught by the teacher online	3.57
How much are you satisfied with the quality of online lectures and course/lab materials shared/taught by the teacher/lab engineer?	3.50
How much are you satisfied with the grading and evaluation system followed by the teacher?	4.07
You want to be taught by this teacher in the next semester	**3.07**
Evaluation	**3.77**

Figure 1: Teachers Evaluation Table

S. No.	Name	Subject	Program	Class	Study in Next Semester	Evaluation
1	Yasir Hameed	Introduction to Mech. Lab	MED (MATHS)	1st	4.50	4.84
2	Ch. Muhammad Usama	Workshop Technology	MED	1st (a,b)	4.58	4.77
3	Ghulam Mubashar	English	MED	1st (a,b)	4.89	4.76
4	Syed Adeel Akhter	Technical Report Writing	MED (MATHS)	3rd	4.83	4.75
5	Shahbaz Naqvi	Design of Machine Elements Lab	MED	5th (c)	4.67	4.73

6	Ammar Akram	Introduction to Mech.	MED (MATHS)	1st	4.50	4.68
7	Col. Abdul Aleem	Engineering Chemistry	MED	1st (a,b)	4.53	4.66
8	Dr. Farhan Ausaf	Engineering Dynamics	MED	3rd (a,b,c)	4.83	4.64
9	Abdul Wahab	Workshop Technology	MED	1st (b)	4.42	4.62
10	Dr. Zarak Khan	Manufacturing Processes	MED	3rd (a,b,c)	4.83	4.61
11	Syed Adeel Akhtar	Technical Report Writing	MED	3rd (a,b,c)	4.81	4.60
12	Dr. Zarak Khan	Basic Electro-Mechanical Engineering	MED (CIVIL)	1st	4.71	4.60
13	Dr. S. Kamran Afaq	Heat & Mass Transfer	MED	5th (a,b)	4.85	4.56
14	Yasir Hamid	Engineering Mechanics Lab	MED	3rd (c)	4.70	4.55
15	Dr. Maaz Hasan	Theory of Machines	MED	5th (a,b,c)	4.55	4.54
16	Saad Arif	Control Systems	MED	7th (a,b)	4.50	4.53
17	Bilal Haider	I.C. Engines Lab	MED	7th (b)	4.54	4.50
18	Dr. Fahad Sarfraz Butt	Fluid Mechanics-II	MED	5th (a,b,c)	4.64	4.49
19	Dr. Luqman Ahmed	Design of Machine Element-I	MED	5th (c,d)	4.50	4.47
20	Ghulam Mubashir	English I	MED (ISD)	1st	4.64	4.47
21	Hammad Ahmed	I.C. Engines Lab	MED	7th (a,c)	4.46	4.45
22	Munazza Haq	Fluid Mechanics Lab	MED	5th (b,c)	4.10	4.44
23	Ahmed Zaheer	Numerical Methods Lab	MED	5th (a,b,c,d)	4.26	4.41
24	Bilal Haider	Heat & Mass Transfer	MED	5th (c,d)	4.00	4.37
25	Dr. Zahid Iqbal	I. C. Engines	MED	7th (a,b,c)	4.28	4.37
26	Dr. Khalid Mehmood	Thermodynamics-I	MED	3rd (a,c)	4.39	4.31
27	Abdul Wahab	CAM Lab	MED	7th (a,b)	4.29	4.28
28	Sardar Aneeq	Applied Engineering Physics	MED	1st (a,b)	3.58	4.27
29	Shahbaz Ali Naqvi	Economics	MED	7th (a,b,c,d)	4.00	4.23

30	Ammar Akram	Fluid Mechanics Lab	MED	5th (d)	3.87	4.17
31	Moeen Mahboob	Instrumentation & Control Systems	MED	7th (c)	4.14	4.10
32	Hammad Asghar	CAM Lab	MED	7th (c,d)	4.20	4.08
33	Imran Sajid	Mechanics of Material-I	MED	3rd (c)	3.80	4.07
34	Moeen Mahboob	Control Systems	MED	7th (c,d)	4.15	4.06
35	Yasir Hamid	Design of Machine Elements Lab	MED	5th (b,d)	3.97	4.03
36	Imran Sajid	CAD/CAM	MED	7th (a,b,c,d)	3.80	4.03
37	Zeeshan Siddique	Instrumentation & Control Systems	MED	7th (a1,d)	3.94	4.01
38	Sardar Aneeq	CAD Lab	MED	7th (a,b,c,d)	3.88	3.97
39	Hammad Asghar	Fluid Mechanics Lab	MED	5th (a)	3.69	3.92
40	Athar Hameed	I. C. Engines	MED	7th (d)	3.59	3.89
41	Dr. Luqman Ahmed	Design of Machine Elements Lab	MED	5th (a)	3.69	3.87
42	Atiya Sadiq	Engineering Mechanics Lab	MED	3rd (a,b)	3.91	3.84
43	Mahad Shah	Instrumentation & Control Systems	MED	7th (a2,b)	3.83	3.84
44	Athar Hameed	I.C. Engines Lab	MED	7th (d)	3.41	3.79
45	Ammar Akram	Thermodynamics-I	MED	3rd (b)	3.07	3.77
46	Mahad Shah	Fluid Mechanics-II	MED	5th (d)	2.80	3.60
47	Dr. Liaqat Ali	Design of Machine Element-I	MED	5th (a,b)	2.63	3.48
48	Zeeshan Siddique	Theory of Machines	MED	5th (d)	2.93	3.25
49	Dr. Tanveer Ahmad	Mechanics of Material-I	MED	3rd (a,b)	2.41	3.13

Table 3 : Teacher's Evaluation Table

See Annexure D (Teachers Evaluation Survey) for teacher's evaluation Performa and the standards against which the students have evaluated them. The total graded marks are 5.

HITEC University and especially the Mechanical Engineering department has a strong tradition of quality enhancement through students' feedback. The teachers' and courses' evaluation is given the due respect, analysis and direction. Teachers with strong feedback are appreciated and teachers with poor feedback are counseled, heard and encouraged. The course feedback is a major source of inspiration for curriculum and syllabi revision.

Program strengths

- Rigorous, intensive and rewarding program
- Capable faculty
- Program weaknesses
- Insufficient infrastructure
- Low number of industry-oriented courses
- Low number of design competitions and intra-university linkages

Standard 1-4 The department must assess its overall performance periodically using quantifiable measures.

Graduates/Undergraduates enrolled in last three years

Active Enrollment of last three years is as follows:

- Year 2022 88
- Year 2021 128
- Year 2020 171

The existing situation of the above intakes is as follows:

Year	Existing #	Dropouts so far
Year 2020	170	36
Year 2021	125	32
Year 2022	88	15

Students, who enrolled during the last three years, have not yet graduated.

Student Faculty Ratio:

18.4 - 1

Average GPA per semester:

Average GPA per semester for the batch enrolled in year 2019 is as under:

Semester 1	2.37
Semester 2	2.45
Semester 3	2.41
Semester 4	2.51
Semester 5	2.53

Semester 6	2.69
Semester 7	2.62

Average Completion time

Average Completion time for undergraduate program is 4 years.

Employer Satisfaction

Employer survey is provided in Annexure D. The survey results are overall satisfactory and encouraging.

Students Course Evaluation Rate

Student Course Evaluation form has been attached as Annexure E. The feedback was taken by QEC staff in the absence of faculty members.

Students Faculty Evaluation

Students Evaluated faculty. The feedback was taken by QEC staff in the absence of faculty members.

Research

The program faculty published research papers in different journals. List attached in Annexure A.

Community Service

HITEC university's students and faculty actively partakes in social welfare and community services. Be it floods or earthquakes or be it blood donation, HITEC University is always at the fore-front of giving back to the community.

Criterion 2: Curriculum Design and Organization

Title of Degree Program

BS Mechanical Engineering
Mechanical Engineering is one of the oldest disciplines of engineering. Initially it was confined to few areas such as Statics, Thermodynamics, Dynamics, and Fluid Mechanics etc. However, in the last half of the century it has seen tremendous growth and expansion. These include areas of Heat & Mass Transfer, Power Plants, Computer Aided Engineering, Computational Mechanics, and Robotics etc. This curriculum has been developed considering above rationale. This program should facilitate teaching of common core courses and a selection of courses depending upon the need of student and availability of resources in the university.

Definition of credit hour:

One credit hour represents one contact hour a week in class or three contact hours a week of laboratory work per semester. An academic semester represents 16 weeks of classes exclusive of exams.

Degree plan

The Mechanical Engineering Degree Plan is shown below:

SEMESTER-1			SEMESTER-2		
Code	Course Title	CH	Code	Course Title	CH
MT 101	Calculus and Analytical Geometry	3 + 0	MT 303	Applied Linear Algebra	2 + 0
BS 102	Engineering Chemistry	2 + 0	EE 220	Fundamental of Electrical Engineering	3 + 0
BS 103	Applied Engineering Physics	2 + 0	IS 211	Islamic Studies	2 + 0
EC 110	Computing Fundamentals	2 + 1	HS 103	Communication Skills	3 + 0
HS 101	English	3 + 0	ME 104	Engineering Drawing & Graphics	0 + 2
HS 102	Pakistan Studies	2 + 0	ME 105	Engineering Statics	3 + 0
ME 101	Workshop Technology	0 + 2	ME 202	Material Science & Engineering	2 + 0
			EE 220L	Fundamental of Electrical Engineering Lab	0 + 1
			TQ-101	Translation of the Quran: Beliefs	1+0 (NC)
Total Credit		17	Total Credit		18
SEMESTER-3			**SEMESTER-4**		
MT 201	Complex Variables & Transforms	3 + 0	MT 103	Differential Equations	3 + 0
HS 201	Technical Report Writing	3 + 0	ME 103	Fluid Mechanics-I	3 + 0
ME 102	Thermodynamics-I	3 + 0	EE 320	Analog and Digital Systems	3 + 0
ME 201	Engineering Dynamics	3 + 0	ME 204	Thermodynamics-II	3 + 0
ME 205	Mechanics of Material-I	3 + 0	ME 301	Mechanics of Material-II	3 + 0
ME 303	Manufacturing Process	2 + 0	EE 320L	Analog and Digital Systems Lab	0 + 1
ME 201L	Engineering 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)
			TQ-201	Translation of the Quran: Worships	1+0 (NC)
Total Credit		18	Total Credit		18
SEMESTER-5			**SEMESTER-6**		
MT 202	Numerical Methods	2 + 1	MT 302	Probability & Statistics	3 + 0
ME 206	Heat & Mass Transfer	3 + 0	HS 401	Professional Values and Ethics	2 + 0
ME 302	Theory of Machines	3 + 0	ME 305	Refrigeration & Air Conditioning	3 + 0
ME 304	Design of Machine Elements-I	3 + 0	ME 308	Design of Machine Elements -II	3 + 0
ME 203	Fluid Mechanics-II	3 + 0	ME 405	Instrumentation & Measurement	2 + 0
ME 308L	Design of Machine Elements Lab	0 + 1	ME 307	Mechanical Vibrations	3 + 0
ME 203L	Fluid Mechanics Lab	0 + 1	ME 305L	Heat Transfer & Refrigeration Lab	0 + 1
			ME 307L	Theory of Machines / Vibrations Lab	0 + 1
			TQ-301	Translation of the Quran: Moral Values	1+0 (NC)
Total Credit		17	Total Credit		18
SEMESTER-7			**SEMESTER-8**		
HS 402	Economics	2 + 0	HS 403	Management & Entrepreneurship	3 + 0
ME 306	I.C Engines	3 + 0	ME 401	Design Project-II	0 + 3
ME 401	Design Project-I	0 + 3	ME 4XX	Elective-I	3 + 0
ME 403	Control Systems	3 + 0	ME 4XX	Elective-II	3 + 0
ME 404	CAD/CAM	2 + 0	ME 407	Health Safety and Environment	1 + 0
ME 306L	I.C Engines Lab	0 + 1	HS 404	Foreign Language	1 + 1

ME 403L	Instrumentation & Control Systems Lab	0 + 1	TQ-401	Translation of the Quran: Dealing and Commandments	1+0 (NC)
ME 404L	CAD/CAM Lab	0 + 1			
Total Credit		16	Total Credit		15

Table 4: Courses and their Respective Course Codes with no of credit hours

Curriculum Breakdown

Semester	Mechanical Engineering Courses		Electrical Engineering Courses		Computer Engineering Courses		Mathematics & Managements Sciences Courses		Basic Sciences & Humanities Courses		Total Cr hr
	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	
Semester 1	1	2	-	-	1	3	1	3	4	9	17
Semester 2	3	7	2	4	-	-	1	2	3	5	18
Semester 3	5	12	-	-	-	-	1	3	1	3	18
Semester 4	5	11	2	4	-	-	1	3	2	- (NC)	18
Semester 5	6	14	-	-	-	-	1	3	-	-	17
Semester 6	6	13	-	-	-	-	1	3	2	2	18
Semester 7	7	14	-	-	-	-	1	2	-	-	16
Semester 8	3	9	-	-	-	-	2	4	1	2	15
Total	**36**	**82**	**4**	**8**	**1**	**3**	**9**	**23**	**13**	**21**	
	Total Courses: 64 **Total Credit Hours: 137**										

Table 5: Mechanical program curriculum breakdown (table 4.3)

Courses Information

HS 101 English

Objective

This is the first courses on English language. Grammar, reading, writing, speaking and listening should be taught as integrated skills of equal importance. Basic pronunciation and vocabulary should be introduced. Students should study basic grammar structures and learn to write basic sentences and simple narrative paragraphs. Computer software technology and Internet assignments should be used for this course.

Books

High School English Grammar & Composition, By Wren & Martin.

Focus on Grammar, Level 1, 2, 2A&2B, By Longman, Latest Edition.

HS 201 Communication Skills

Objective

The objective of this course is to enable the students apply the knowledge and skills acquired in English course in the earlier semester. The students will improve their skills to optimal levels in speaking by making eye contact. The course also aims at enabling the students to enhance their communication skills.

Books

Human Communication, by Tubbs & Moss.
Business Communication – Strategies and Skills, by Lahiff & Penrose.

HS 202 Technical Report Writing

Objective

The objective of this course is to enable the students apply the knowledge and skills acquired in English course in the earlier semester. The students will improve their skills to optimal levels in reading, writing, listening and speaking. The course also aims at enabling the students to enhance their technical writing skills and equipping them with fairly good vocabulary.

Books

Kaplan Technical Writing: A Resource for Technical Writers at All Levels, by Carrie Hannigan, Carrie Wells, Carolyn Stevenson and Tanya Peterson.

HS 102 Pakistan Studies

Objective

The objective of this course is to upraise the knowledge about the history of Pakistan, Geo-Political Scenario, and to develop better understanding about different characteristics of Pakistani culture and regions.

Books

Comprehensive Pakistan Studies by M .Ikram Rabbani.

HS 301 Islamic Studies

Objective

The objective of this course is to provide basic information about Islamic studies, to enhance understanding regarding Islamic civilization and to enhance the skills of students for understanding issues related to faith and religious life.

Books

Emergence of Islam, By Hameedullah Muhammad.
Islamic Education, By A.S. Bukhari& M.D. Zafar.

BS 101 Engineering Physics

Objective

This course is designed to clarify basic concepts of students before starting their regular engineering courses, as this course will also refresh their elementary knowledge .it is also meant to convey the basic physical concepts that lie behind all electrical and mechanical engineering. The combination of basic Physics rules and designing art will lead to innovation and invention. This is the identification of a well-trained and groomed ENGINEER. This course is prerequisite for Engineering Dynamics, Engineering Statics, Fluid Mechanics, and Thermodynamics etc.

Prerequisite

University Physics (11th edition) by David G. Young.
Halliday, Resnick and Krane, Physics, 5th Volume.

BS 102 Engineering Chemistry

Objective

This course is also designed to clarify basic concepts of students before starting their regular engineering courses, as this course will also refresh their elementary knowledge. This course is meant to lay foundations for Mechanics of Materials, Materials sciences & Engineering.

Books

Hydrocarbons - Physical Properties & their Relevance to Utilization. (By: J.C. Jones).
Chemical Thermodynamics. (By: Leo Lue).

BS 302 Professional Values and Ethics

Objective

To inculcate highly remarkable ethical habits in the personalities of the students
To train students in professional ethics and make them able to apply their knowledge in all sphere of life generally and in the profession of engineering particularly
To develop their skills of effective dealing with their clients and organizations
To try to motivate them to be world-class Muslim engineers.

Books

Verses from the Quran related to the topics

Traditions of the Holy Prophet (S.A.W) particularly Kitab-ul-Adab (Chapters related to the values, ethics and etiquettes)
Muslims Character by Muhammad al-Ghazali
Akhlaq and Falsafa-e-Akhlaq by Hifaz Ur Rehman Siyuharvi
Serat al-Nabi by Syed Sulyman Nadvi (vol. VI)
Reference Books (Contd.)
Medical Ethics, A booklet written for professional doctors

MT 101 Calculus & Analytical Geometry

Objective

Introduction to Functions and Limits. Derivatives and Applications. Advance Calculus. Derivatives. Integration.

Books

Calculus, By George B. Thomas, Rolls L. Finney.
Calculus, By Howard Anton.

MT 102 Linear Algebra and Ordinary Differential Equations

Objective

The Introduction to Differential Equations. Exact and Non-exact Equations. Equations. Linear Differential Equations of Higher Order. Introduction to Linear Algebra.

Books

Differential Equations with Boundary Value Problems, byDennis G. Zill.
Advanced Engineering Mathematics, by Erwin Kreyszig.
Introductory Linear Algebra, by Howard Anton

MT 201 Complex Variables and Transforms

Objective

Complex Number System and Complex Variable Theory. Laplace Transform. Fourier Series/Transforms. Vectors Calculus.

Books

Laplace Transform, by Murray R. Spiegel.
Complex Variables and application, byJames Ward Brown and Ruel V. Churchill.
Advanced Engineering Mathematics, by Erwin Kreyszig

MT 202 Numerical Methods

Objective

This course is designed to prepare students for solving different problems using Algorithms of different techniques, also to develop algorithms in computer to solve the problem. This will improve the computational capability of the students.

Books

E. Kreyszig: Advanced Engineering Mathematics (8thed).

MT 301 Partial Differential Equations

Objective

Introduction to Partial differential equations. Diffusion-Type Problems. Hyperbolic-Type Problems. Elliptic-Type Problems.

Books

Partial Differential Equation for Scientists and Engineers,byStanley J. Farlow.
Partial Differential Equations, by Lawrence C. Evans.
An Introduction to Partial Differential Equations, by Yehuda Pinchover and Jacob Rubinstien.

MT 302 Probability & Statistics

Objective

Descriptive Statistics. Basic Probability. Conditional Probability and Independence. Random Variables. Binomial, Poisson, Chi-square and Normal Distributions

Books

Introduction to statistics, by Ronald E. Walpole.
Introduction to Probability and Statistics, byJohn Schiller and Seymour Lipschutz.

MS 201 Engineering Economics

Objective

The course is designed to develop awareness among engineers about the market trends and to enhance their marketing and financing skills. Be able to communicate the results of the modeling process to management and other non-specialist users of engineering analyses.

Books

Engineering Economy, by Anthony J. Tarquim&LolandT.Blank, McGraw Hill

MS 401 Engineering Management

Objective

The course aims to introduce students to main concepts of Engineering Management, Industries, Management Theories, & Environmental Scanning, PESTG Analysis, SWOT Analysis, Porter Forces, Market Grid, BCG Matrix.

Books

Project Management, Third Edition, Harvey Mylor, Pearson Prentice Hall, 2003
Total Quality Management, Dale H Bersterfied,Pearson Prentice Hall, 2008
Principles of Management, Stephen Robins

ME 101 Workshop Technology

Objective

This course introduces the students to real piratical work in workshop. Students will use different machines i.e. milling machine, Lathe machine which will help them in their profession.

Objective

Workshop Technology Part-I by W.A.J. Chapman

ME 102 Thermodynamics-I

Objective

The course is included to give students knowledge about the basic and one of the oldest branches of mechanical engineering. This is the first course of the two courses offered, it covers different thermodynamics cycles and laws. This course introduces students to the design and analysis of thermal systems. Students learn to formulate and solve thermal systems problems, and integrate this analysis into the optimal design of thermal systems. Students must communicate solutions in a manner consistent with Workshop Technology.

Books

Thermodynamics, an Engineering Approach byY.A. Cengel and M. A. Boles
Applied Thermodynamics by Eastop & McConkey.

ME 103 Fluid Mechanics-I

Objective

This is the first of the two courses offered in Fluid dynamics. It covers basic concepts of Fluid dynamics i.e. Flow types, boundary layer etc. Fluid Dynamics is one of the most oldest branches of Mechanical Engineering and its applications covers almost all fields i.e. Aerospace, Gas Dynamics etc.

Books

Fluid Mechanics by Y. Cengel, C.M. Cimbala
Fundamentals of Fluid Mechanics byBruce R. Munson, Donald F. Young and Theodore H. Okilishi.
Engineering Fluid Mechanics byJ.A.Robertson and C.T.Crowe, 5th Ed,

Fluid Mechanics by Frank M. White.
Fundamentals of Fluid Mechanics by Bruce R. Munson, 4th Ed

ME 104 Engineering Drawing & Graphics

Objectives

This course is a part of engineering foundation. It is targeted to help student visualize the basics of engineering design. Emphasis would be on basic drawing concepts and the classical techniques of manual drawing. It is intended for improving students approach towards conceptual design.

Books

Engineering Drawing and Graphics by N.D. Bhatt
Beginning AutoCAD 2002 by Bob McFarlane

ME 105 Engineering Statics

Objective

It is also part of Engineering Foundation and is oldest branches of Mechanical engineering. This course actually is a division of Mechanics i.e. Statics & dynamics. This course improves the student ability to problem solving regarding forces acting on stationary objects.

Books

Engineering Mechanics (Vol. 1) by R.C. Hibbler.
Engineering Mechanics (Vol. 1) by J.L. Merriam & L.G. Kraig.
Engineering Mechanics (Vol. 1) by F.P. Beer & E.R. Johnston

ME 201 Engineering Dynamics

Objective

It is also part of Engineering Foundation and is oldest branches of Mechanical engineering. This course actually is a division of Mechanics i.e. Statics & dynamics. This course improves the student ability to problem solving regarding forces acting on stationary objects.

Books

Engineering Mechanics (Vol. 2) by J.L. Merriam& L.G. Kraig.
Engineering Mechanics (Vol. 2) by F.P. Beer & E.R. Johnston.
Engineering Mechanics (Vol. 2) by R.C. Hibbler.

ME 202 Material Science and Engineering

Objective

This course introduces students Industrial Materials, their development, chemical properties of these materials also their structural behavior under different operating conditions.

Books

An Introduction to Materials Science and EngineeringWilliam D., Jr. Callister.
Materials and Processes in Manufacturing byDegarmo, Kohsar and Black
Elements of Material Science & Engineering, by Van Vlack.

ME 203 Fluid Mechanics-Ii

Objective

This is second course of Fluid Mechanics. It takes students to one step further in the field of Fluid dynamics. It not only covers fluid Mechanics course but also describes its application Fields.

Books

Fluid Mechanics by Y. Cengel, C.M. Cimbala
Fundamentals of Fluid Mechanics byBruce R. Munson, Donald F. Young and Theodore H. Okilishi.
Engg. Fluid Mechanics by J.A.Robertson&C.T.Crowe, 5th Ed,
Fluid Mechanics by Frank M. White.
Fundamentals of Fluid Mechanics by Bruce R. Munson, 4th Ed.

ME 204 Thermodynamics-II

Objective

Thermodynamics is an engineering science that is central to most mechanical engineering applications. This is the second course offered in Thermodynamics. The course provides a background for understanding how energy systems such as engines, turbines and refrigerators operate.

Books

Thermodynamics, an Engineering Approach byY.A. Cengel and M.A. Boles
Applied thermodynamics By Eastop&McConkey
Turbines, Compressor and Fans by S.M Yahya

ME 205 Mechanics of Materials-I

Objective

This course introduces students to structural problems. Structure is one the most important Fields. This is the first course offered in a series of two Mechanics of Materials Courses.

Books

Mechanics of Materials by F.P.Beer& E.R. Johnston Mechanics of Materials by l.M.Gere&S.P.Timoshenko
Mechanical Engineering Design by Shigley

ME 206 Heat and Mass Transfer

Objective

These courses further strengthen the knowledge of the students regarding heat & mass transfer. Thermodynamics-I & Thermodynamics-II courses offered in earlier semesters lays foundation for this course.

Books

Heat Transfer –A Practical Approach by Y.A .Cengel
Heat Transfer by J.P. Holman

ME 301 Mechanics of Materials–II

Objective

This course introduces students to Structural problems. This course is second of the courses of Mechanics of Materials. Practical applications are discussed which helps students to solve practical problems.

Books

Mechanics of Materials by J.M.Gere&S.P.Timoshenko,
Mechanics of Materials by F.P. Beer, E.R. Johnston,
Mechanics of Engineering Materials by P.P. Benham.
Mechanical Engineering Design by Shigley.

ME 302 Theory of Machines

Objective

At the end of the course, students would be able to analyze and evaluate various basic mechanisms which individually or collectively form the basis of design of machinery in mechanical engineering field. This course would introduce the mechanical engineering student to the process of design. He/she would be able to visualize mechanisms and would be able to check its practical worthiness before embarking upon path to manufacture it

Books

Theory of Machines by J.E. Shigley
Design of Machinery by R. Norton.

ME 303 Manufacturing Processes

Objective

This course helps students to significantly improve their capabilities regarding the processes involved in manufacturing. This course also help students in their future studies i.e. Graduate studies etc.

Books

Manufacturing Engineering and Technology by Kalpakjian,
Process and materials of manufacture by R.A Lindberg,
Principle of Engineering Production by AJ Lissaman& SJ.
Workshop Technology by Chapman

ME 304 Design of Machine Elements-I

Objective

Basic criteria of the performance and design of machine parts. Determination of permissible and actual stresses. Design of simple element. Design of keys, cotters, 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 & tolerances

Books

Mechanical Engineering Design by J.E. Shigley
Machine Design, by R.S. Khurmi

ME 305 Refrigeration & Air-Conditioning

Objective

Students will learn the basic concepts and principles of air conditioning and refrigeration and will learn the fundamental analysis methodology, basic process and systems of air conditioning and refrigeration. Then apply the course knowledge to do a design project of HVAC (Heating Ventilation & Air conditioning) system.

Books

Refrigeration and Air Conditioning byW.F. Stoecker/ Jerold W. Jones.
Refrigeration Air Conditioning by C. P. Arora
Modern Refrigeration and Air Conditioning byAlthouse, Turnquist, and Bracciano
Air Conditioning Principles and Systems by Edward G. Pita

ME 306 Internal Combustion Engines

Objective

This course introduces students to Engines and their characteristics, this course also lays foundation for Power plants which offered in the semester next to the I.C. engines is offered. Apply the principles of thermodynamic analysis to IC engine cycles. Learn fundamentals of combustion analysis and understand the principles behind the basic steps in engine operation.

Books

Internal Combustion Engines, 2nd Edition by Collin R Ferguson and Allan
Internal Combustion Engine, 3rd Edition by V Ganeson

ME 306 ME 307 Mechanical Vibrations

Objective

This course will have a good understanding of the modeling of vibratory motion of mechanical systems using both single and multiple degree of freedom concepts. Students will be able to design simple vibration isolation systems. They will understand the concepts of natural frequencies and mode shapes and their significance in the solution of multiple degree of freedom problems. Students will have an introduction to the use of Laplace Transforms as a solution to differential equations of motion. They will be able to complete basic system modeling tasks.

Books

Mechanical Vibrations by S. S. Rao (4th edition)
Mechanical Vibrations by Schaum's Outline Series
Theory of Vibration with Applications by William T. Thomson

ME 308 Design of Machine Elements-II

Objectives

Design of fly wheel. Design of Brake / Clutches. Design of Power Screws. Translation Screws. Design of Belt and chain drive .Selection of bearings.

Books

Mechanical Engineering Design by J.E. Shigley
Machine Design, by R.S. Khurmi

ME 402 Power Plants

Objective

This Course will introduce the student industrial applications. Mechanical Engineers have vast opportunity to join this as their career & it also helps them in their future studies.

Books

Power Plant Technology by M.M El Wakil,
Power Plant Engineering by Larry Drbal, Kayla Westra, and Pat Boston.
Applied Thermodynamics for Engineering Technologist byT.D. Eastop&J. McConkey.

ME 403 Control Systems

Objective

The course deals with the essentials of feedback control theory as applicable to mechanical/electromechanical systems. The student learns to develop mathematical model of a given system, through its governing differential equations. These equations are Laplace-Transformed to define the concept of transfer function of the system and its stability is discussed in details. The course deals with linear, time-invariant and continuous domain systems up to second order only. Drawing of root locus plot and its analysis is also included in course.

Books

Design of Feedback Control System, 4th edition by Stefani, Savant, Shahian &Hostettler (Oxford University Press)
Modern Control Systems, 8th edition by Richard C Dorf, Robest H Bishop (Addison Wesely)

ME 404 CAD/CAM

Objective

To develop a thorough understanding of the computer aided drawing and manufacturing process from a simple line drawn in pro E to the complete manufactured part. The initial study is focused on CAD on Pro E, after that the course will move towards CNC part programming using CNC Simulator to conclude at computer integrated manufacturing.

Books

CAD/ CAM concepts and application by Chennakesava R. Alavala
CAD/ CAM by P. Groover
CAD/ CAM by Chris McMahon and Jimmie Bowne

ME 405 Instrumentation & Measurements

Objective

To learn the basic principles of a measuring system including various methods of sensing, instrument types and characteristics, display and recording elements and their applications in measurement of temperature, flow, pressure, force, level, displacement and other common physical parameters. Upon completion of the course, students will be able to select measuring devices and instruments for different types of process and to utilize the output of these instruments for the control of different processes.

Books

Introduction to Pro/ENGINEER by Eric Wiebe, Jessica LoPresti, Harlene Yount
Creo Parametric 1.0 Update Manual for Wildfire 5.0 Users by Steven G. Smith.
Automation, Production Systems, and CAM by M.P.Groover.
Computer Control of Machines and Processes by Bollinger &Duffie.

Standard 2-1The curriculum must be consistent and supports the program's documented objectives.

Semes.	Course Code	Title	1	2	3	4	5	6	7	8	9	10	11	12
1	MT 101	Calculus and Analytical Geometry	X	X										
	BS 102	Engineering Chemistry	X						X					
	BS 103	Applied Engineering Physics	X	X										
	EC 110	Computing Fundamentals	X		X		X							
	HS 101	English										X		
	HS 102	Pakistan Studies						X						
	ME 101	Workshop Technology	X	X		X								
2	MT 303	Applied Linear Algebra	X											
	EE 220	Fundamental of Electrical Engg.	X											
	IS 211	Islamic Studies								X				
	HS 103	Communication Skills										X		
	ME 104	Engineering Drawing & Graphics	X	X										
	ME 105	Engineering Statics	X	X										
	ME 202	Material Science & Engineering	X						X					
	EE 220L	Fundamental of Electrical Engg. Lab					X				X			
3	MT 201	Complex Variables and Transforms	X											
	HS 201	Technical Report Writing										X		
	ME 102	Thermodynamics-I	X	X										
	ME 201	Engineering Dynamics	X	X										
	ME 205	Mechanics of Material-I	X	X	X									

	ME 303	Manufacturing Process	X	X	X				X						
	ME 201L	Engineering Mechanics Lab	X	X						X		X			
4	MT 103	Differential Equations	X	X											
	ME 103	Fluid Mechanics I	X	X											
	EE 320	Analog and Digital Systems	X	X											
	ME 204	Thermodynamics-II	X	X											
	ME 301	Mechanics of Material-II		X	X										
	EE 320L	Analog and Digital Systems Lab	X												
	ME 204L	Thermodynamics Lab	X			X						X			
	ME 205L	Mechanics of Material Lab	X	X	X	X									
	HS 203	Community Service													
5	MT 202	Numerical Methods	X												
	ME 206	Heat & Mass Transfer	X	X											
	ME 302	Theory of Machines	X	X	X										
	ME 304	Design of Machine Elements-I	X		X							X			
	ME 203	Fluid Mechanics-II	X	X											
	ME 308L	Design of Machine Elements Lab	X				X								X
	ME 203L	Fluid Mechanics Lab	X			X					X	X			
6	MT 302	Probability & Statistics	X	X											
	HS 401	Professional Values and Ethics								X					
	ME 305	Refrigeration & Air Conditioning	X	X	X				X						
	ME 308	Design of Machine Elements -II		X	X										
	ME 405	Instrumentation & Measurement	X		X	X									
	ME 307	Mechanical Vibrations			X										
	ME 305L	Heat Transfer & Refrigeration Lab	X	X		X									
	ME 307L	Th. of Machines / Vibrations Lab				X		X		X		X			
7	HS 402	Economics		X			X						X		
	ME 306	I.C Engines	X	X	X										
	ME 401	Design Project-I			X							X	X	X	
	ME 403	Control Systems	X	X	X										
	ME 404	CAD/CAM			X								X	X	
	ME 306L	I.C Engines Lab	X			X						X			
	ME 403L	Instrumentation & Control Systems Lab	X		X	X									X
	ME 404L	CAD/CAM Lab			X		X			X					X
8	HS-403	Management and Entrepreneurship					X						X	X	

	ME 401	Design Project-II						X	X	X	X			X
	ME 407	Health Safety and Environment						X	X		X			
	HS 404	Foreign Language												X
	ME-402	Power Plants		X					X					
	ME 410	Gas Dynamics	X	X										
	ME 411	Computational Fluid Dynamics		X			X							
	ME-412	Industrial Engineering	X	X				X						
	ME 427	Robotics	X	X							X			
	ME 416	Renewable Energy Resources	X					X						X
	ME 422	Advanced Stress Analysis	X	X										

Table 6: Course vs Outcome mapping

Standard 2-2 Theoretical backgrounds, problem analysis and solution design must be stressed within the program's core material.

Sr. No.	Course Code	Course Name	**Theoretical Background**	**Problem Analysis**	**Solution Design**
1.	ME-101	Workshop Technology	X	X	
2.	ME-102	Thermodynamics-I	X	X	X
3.	ME-103	Fluid Mechanics-I	X	X	X
4.	ME-104	Engineering Drawing & Graphics	X	X	X
5.	ME-105	Engineering Statics	X	X	
6.	ME-201	Engineering Dynamics	X	X	
7.	ME-202	Material Science & Engineering	X	X	
8.	ME-203	Fluid Mechanics-II	X	X	X
9.	ME-204	Thermodynamics-II	X	X	X
10.	ME-205	Mechanics of Material-I	X	X	X
11.	ME-206	Heat & Mass Transfer	X	X	X
12.	ME-301	Mechanics of Material-II	X	X	X
13.	ME-302	Theory of Machines	X	X	X
14.	ME-303	Manufacturing Processes	X	X	
15.	ME-304	Design of Machine Elements-I	X	X	X
16.	ME-305	Refrigeration & Air Conditioning	X	X	
17.	ME-306	I.C. Engines	X	X	X
18.	ME-307	Mechanical Vibrations	X	X	
19.	ME-308	Design of Machine Elements-II	X	X	X
20.	ME-401	Design Project-I & II	X	X	X
21.	ME-402	Power Plant	X	X	
22.	ME-403	Control Systems	X	X	
23.	ME-404	CAD/CAM	X	X	
24.	ME-405	Instrumentation & Measurements	X	X	X
25.	ME-407	Health, Safety & Environment	X		
26.	ME-412	Industrial Engineering	X	X	X
27.	ME-427	Robotics	X	X	X
28.	ME-422	Advanced Stress Analysis	X	X	X

29.	BS-102	Engineering Chemistry	X	X	
30.	BS-103	Applied Engineering Physics	X	X	
31.	HS-101	English	X		
32.	HS-102	Pakistan Studies	X		
33.	HS-103	Communication Skills	X		
34.	HS-201	Technical Report Writing	X		
35.	HS-203	Community Service	X	X	X
36.	HS-401	Professional Values and Ethics	X		
37.	HS-402	Economics	X	X	
38.	HS-403	Management & Entrepreneurship	X	X	
39.	HS-404	Foreign Language	X		
40.	IS-211	Islamic Studies	X		
41.	EE-220	Fundamentals of Electrical Engineering	X	X	X
42.	EE-320	Analog and Digital Systems	X	X	X
43.	EC-110	Computing Fundamentals	X	X	X
44.	MT-101	Calculus & Analytical Geometry	X	X	X
45.	MT-103	Differential Equations	X	X	
46.	MT-201	Complex Variables and Transforms	X	X	X
47.	MT-202	Numerical Methods	X	X	X
48.	MT-302	Probability and Statistics	X	X	X
49.	MT-303	Applied Linear Algebra	X	X	X
50.	EE-220	Fundamental of Electrical Engineering	X	X	
51.	IS 211	Islamic Studies	X		
52.	HS 404	Foreign Language	X		

Table 7: Standard 2-2 Requirement

Standard 2-3 The Curriculum must satisfy the core requirements for the program as specified by the respective accreditation body.

BS Mechanical Engineering program is accredited by the Pakistan Engineering Council (PEC) under Washington Accord OBE Level-II from intake 2012 onwards and has no deviation from PEC requirements. Minimum Requirements for each program (Program Semester Credit Hours)

Semester	Mechanical Engineering Courses		Electrical Engineering Courses		Computer Engineering Courses		Mathematics & Managements Sciences Courses		Basic Sciences & Humanities Courses		Total Cr hr
	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	No. Of Courses	Credit Hours	
Semester 1	1	2	-	-	1	3	1	3	4	9	17
Semester 2	3	7	2	4	-	-	1	2	3	5	18
Semester 3	5	12	-	-	-	-	1	3	1	3	18

Semester 4	5	11	2	4	-	-	1	3	2	- (NC)	18
Semester 5	6	14	-	-	-	-	1	3	-	-	17
Semester 6	6	13	-	-	-	-	1	3	2	2	18
Semester 7	7	14	-	-	-	-	1	2	-	-	16
Semester 8	3	9	-	-	-	-	2	4	1	2	15
Total	**36**	**82**	**4**	**8**	**1**	**3**	**9**	**23**	**13**	**21**	
	Total Courses: 64 **Total Credit Hours: 137**										

Table 8: Program Credit Hours

Standard 2-4 The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

Same as Standard 2-3.

Standard 2-5 The curriculum must satisfy general education, arts and professional and other discipline requirements for the program as specified by the respective accreditation body.

Same as standard 2-3 and Standard 2-1 (table 4.4) as defined above.

Standard 2-6 Information technology component of the curriculum must be integrated throughout the program

Semester 1 contains the 2+1 credit hours (5 contact hours) of information technology topics (Introduction to Computers, and C++), out of which 2 credit hours are for theoretical work and 1 credit hour is dedicated to laboratory work. This course educates the students with the basics of the computer sciences and its application in the field of engineering.

Semester 5 contains the 1 credit hour (3 contact hours) lab work teaching ANSYS. This course educates the students with the programming concepts and analysis software applications.

Semester 6 teaches 1 credit hour (3 contact hours) MATLAB lab in which they learn basics of coding high level programming languages.

Semester 7 teaches 1 credit hour (3 contact hours) lab work of Computer Aided Design and Computer Aided Manufacturing comprising of SolidWorks and subsequent practice on Computer Numerically Controlled programming and machine controls.

The knowledge provided during these courses is applicable throughout the program whenever students do practical work in laboratory for any course and that requires the knowledge of Information technology concepts to execute their work. These courses also help them during the final project which always requires the designing of their projects using relevant software applications.

Standard 2-7 Oral and written communication skills of the student must be developed and applied in the program.

Students go through the compulsory course of 3 credit hours titled Communication Skills (course number HS 201) and 3 credit hours Technical Report Writing (course number HS 202) which develops the oral and written communication skills of the students. These courses are given due weightage.

Criterion 3: Laboratories and Computing Facilities

HITEC has established multiple laboratories for students to practice their learning outcomes. Following is the list of available laboratories:

1. Thermodynamics Lab
2. IC Engine Lab.
3. Fluid Mechanics Lab.
4. Engineering Mechanics Lab.
5. Theory of Machines and Vibration Lab.
6. Mechanics of Materials Lab.
7. Heat Transfer & RAC Lab.
8. Workshop Technology Lab. (Machine Shop and Welding Shop)
9. CAM Lab.
10. Machine Design and CAE lab
11. Instrumentation and Control lab
12. Computational Fluid Dynamics Lab

The details about these laboratories are provided on the following pages:

Laboratory Title	**Fluid Mechanics Lab**	**Instrumentation and Control Lab**	**Theory of Machines & Vibration Lab**
Location & Area	Laboratory no 01 (Ground floor)	Laboratory no 2 (Ground floor)	Laboratory no 03 (Ground floor)
Objectives	To demonstrate concepts of fluid mechanics at under-graduate level and to carry out research at post graduate level.	To demonstrate functioning of instruments and their controls.	To demonstrate the concepts learned in the subjects of “Theory of Machines” and “Mechanical Vibrations”
Adequacy for Instruction	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.
Courses Taught	Fluid Mechanics and Advanced Fluid Mechanics	Instrument and Controls	Theory of Machines Mechanical Vibrations

Major Apparatus/ Equipment	*1.* Hydraulic Bench *2.* Dead Weight Tester *3.* Bernoulli's Theorem Apparatus *4.* Energy Losses In Bends & Fittings *5.* Francis Turbine *6.* Osborne's Reynolds Apparatus 7. Hydrostatic Pressure Apparatus *8.* Impact of Jet Apparatus *9.* Demonstration Reaction Turbine *10.* Pelton Wheel Turbine *11.* Pipe Friction Apparatus *12.* Pitot Tube *13.* Drag Coefficient Apparatus 14. Free & Force Vortex Apparatus *15.* Metacentric Height Apparatus *16.* Series/ Parallel Pump Rig *17.* Viscometer *18.* Digital Tachometer *19.* Flow Visualization Wind Tunnel	1. Temperature Control Trainer 2. Pressure Control Trainer 3. Process Control Trainer 4. Flow Control Trainer 5. Level Control Trainer 6. Flexible Manufacturing System 7. Temperature Measurement Bench 8. Sensor & Instrumentation System	1. Slotted link apparatus 2. Four bar chain apparatus 3. Crank & connecting rod apparatus 4. Whitworth quick return apparatus 5. Flat belt drive 6. Internal Gear And Pinion Drive 7. Spur Gear Model 8. Wheel & axel Apparatus 9. Spur Gear Lifting Apparatus 10. Bifilar / Trifler Suspension Apparatus 11. Helical Gear Model 12. Fly Wheel 13. Winch 14. Helical Bevel Gear 15. Bevel Gear Model 16. Epicyclical Gear Apparatus 17. Compound pendulum 18. Helical rack & pinion cut-section 19. Hooks coupling apparatus 20. Geneva mechanism apparatus 21. Static & dynamics balancing apparatus 22. Gyroscope apparatus 23. Universal vibration apparatus 24. Screw jack Apparatus 25. Leaf Spring 26. Whirling of Shaft 27. Crank Slider 28. Screw Jack Cut Model 29. Pump Gear Model 30. Worm and Wheel 31. Inertia of Fly Wheel Apparatus 32. Torsional Vibration Apparatus 33. Simple Screw jack
Software Available	Data Acquisition for sub-Sonic Wind Tunnel	1. Sensor & Instrumentation System 2. Siemens (Flexible Manufacturing System)	TM-150 (Universal Vibration)
Safety Regulations	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.

Table 9: Laboratories Details 1

Laboratory Title	**Production Tooling and Automation**	**Thermodynamics Lab**	**Heat and Mass Transfer Lab**
Location & Area	Laboratory no 4 (Ground floor)	Laboratory no 5 (Ground floor)	Laboratory no 6 (Ground floor)
Objectives	To demonstrate and make the students work on computer	To demonstrate basic "Thermodynamics" and	To demonstrate the concepts of different modes of heat and mass transfer.

	programmed machines used in production line.	demonstrate the working of " Mini Steam Power Plant"	
Adequacy for Instruction	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.
Courses Taught	Workshop Technology Production and Automation	Thermodynamics Power Plant	Heat and Mass Transfer Refrigeration and Air-conditioning
Major Apparatus / Equipment	1. CNC LATHE MACHINE 2. CNC MILLING MACHINE	1. Condensation unit 2. Flow Boiling Demonstration unit 3. Steam Power Plant 4. Change of State Of Gasses 5. Demonstration Models 6. 2 Stroke Petrol Engine 7. 2 Stroke Diesel Engine 8. 4 Stroke Petrol Engine 9. 4 Stroke Diesel Engine 10. Steam Engine Factory Model 11. Wankel Engine 12. Turbojet Engine	1. Free & Force Convection Apparatus 2. Heat Conduction Unit 3. Heat Exchanger 4. Thermal Radiation 5. Demonstration of Refrigeration 6. Air Conditioning trainer 7. Thermal Conductivity Of Liquid & Gases
Software Available	1. Master cam 2. CNC Simulator 3. Auto cad 4. CREO parametric	1. TH-136 Software	1. Free & Force Convection WL352 2. Heat Conduction WL372 3. Heat Exchanger HE158C
Safety Regulations	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.

Table 10: Laboratories Details 2

Laboratory Title	**Engineering Mechanics Lab**	**Mechanics of Materials Lab**	**IC Engine Lab**
Location & Area	Laboratory no 7 (Ground floor)	Laboratory no 08 (Ground floor)	Laboratory no 09(Ground floor)
Objectives	To demonstrate the basic concepts of "Engineering Mechanics"	To demonstrate the concepts of different types of stresses and strains and demonstrate material testing.	To demonstrate the concept of IC Engine and related topics
Adequacy for Instruction	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.
Courses Taught	Engineering Mechanics Engineering Physics	Mechanics of Materials Machine Design Materials Science	Internal Combustion Engines Automobile Engineering
Major Apparatus / Equipment	1. Compression of Spring 2. Fletchers Trolley 3. Moment and Moment Arm 4. Extension of Spring 5. Simple Supported Beam 6. Gear Demonstration 7. Cam and Follower 8. Frame Structure Apparatus	1. Rockwell Hardness Tester 2. Brinell Hardness Tester 3. Torsion Testing machine 4. Universal Testing Machine 5. Fatigue Testing Machine 6. Spring Testing Machine 7. Impact Testing Machine	1. SMALL ENGINE TEST BED 2. Four Stroke Petrol Engine 3. Sectioned Gear Box 4. Sectioned Gear Box With Fly Wheel & Clutch 5. 4 Stroke Diesel Engine 6. Sectioned Diesel Fuel Injection Pump

	9. Polygon of Forces 10. Angular and Linear Speed 11. Centre of Gravity Apparatus 12. Coefficient of Friction 13. Centrifugal Apparatus 14. Extension of spring 15. Rolling Disk Apparatus 16. Inertia Apparatus 17. Toggle joint 18. Forces in Truss apparatus 19. Simple and Compound Pulleys	8. Creep Testing Machine 9. Strain Gauge Trainer 10. Rubber Block Apparatus 11. Torsion of Rods & Bars 12. Deflection of Beams 13. Area Moment Method 14. Deflection of Curved Bars 15. Polaris cope 16. Thick Wall Cylinder 17. Thin Wall Cylinder	7. Sectioned Cooling Fan ,clutch 8. Sectioned Self-Starter 9. Sectioned Fuel Filter
Software Available		1. VDAS (Strain Gauge Trainer) 2. VDAS (Testing Machine) 3. Universal Testing Machine	1. ECA Software 2. VDAS Software
Safety Regulations	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.

Table 11: Laboratories Details 3

Laboratory Title	**Machine Shop**	**Welding Shop**	**CAE LAB**
Location & Area	Laboratory no 10 (Ground floor)	Laboratory no 11 (Ground floor)	Laboratory no 01 (2nd floor)
Objectives	To train the students on basic skills and machines used in an Engineering Workshop	To train students on electric and gas welding and other welding techniques	To provide students with required software for practice and enhance their capability to achieve results with higher accuracy.
Adequacy for Instruction	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff	All required instructions and charts are displayed in the lab at appropriate places for use by faculty, students and support staff.
Courses Taught	Workshop Technology	Workshop Technology	Composite Materials, Machine Design aided by ANSYS Software and Matlab, Engineering Drawing.
Major Apparatus / Equipment	1. Universal Lathe 2. Center Lathe Machine 3. Drum Type Turret Lathe Machine 4. Universal Milling 5. Vertical Milling Machine 6. Shaper Machine 7. Power Hack Saw 8. Double End Grinder 9. Bench Vice 10. Marking Table 11. Drilling Machine	1. Welding Plant 2. Spot Welding Machine 3. Gas welding plant 4. Punch Machine 5. Rivet Gun 6. Power Cutter 7. Baby Grinder 8. Sheet Cutter	Computers with licensed software
Software Available			1. ANSYS CD (32bit,64bit) 2. ANSYS LINEX CD 3. NVIDIA(Graphic Card CD)

			4. INNO3D(Graphic Card CD) 5. Graphic Drivers CD 6. Auto Cad 7. Solidworks
Safety Regulations	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.	Safety regulations are being strictly followed and displayed in each lab.

Table 12: Laboratories Details 4

Standard3-1 Laboratory manuals/documentation/instructions for experiments must be available and easily accessible to faculty and students.

All manuals and instructions are available with the Laboratory in charge and copies of these are also available with program coordinator and program in charge to be used by faculty members and students. These manuals and instructions are issued to desired entity through a defined process and proper record is being kept. The laboratory in charge keeps the manuals and instructions in laboratory for immediate access to students and faculty members during the laboratory work.

Laboratory equipment and facilities in HITEC are comparable to any high reputed university of the country.

Standard 3-2 There must be support personal for instruction and maintaining the laboratories.

Each laboratory has 2 staff members which are Laboratory in Charge and laboratory Attendant.

Laboratory in charge is responsible for overall maintenance of laboratory and also maintains the manuals and instructions while the Laboratory Attendant is responsible for the maintenance of the laboratory equipment and general duties within the lab.

Standard 3-3 The University computing infrastructure and facilities must be adequate to support program's objectives.

The computer laboratories are equipped with state of the art computers and relevant equipment. The program objectives require the students to be equipped with IT skills at the end of the program and facilities (equipment and software) provided in the computer laboratories are adequate enough to achieve program objectives. Computing facilities in HITEC are comparable to any high reputed university of the country.

Criterion 4: Student Support and Advising

Since the launch of HITEC University in year 2007, all its programs have started and finished on schedule. The beauty of the HITEC culture is that teachers and students have facility of frequent interaction, even after classes, for any professional and academic advice. This aspect is even highlighted and indicated by the students in the feedback on HEC Performa number 10, taken by the Quality Enhancement Cell (QEC) in the university.

Standard 4-1 Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

The department strategy to offer courses (core and electives) for the subject program is based on schedule approved by Pakistan Engineering Council (PEC), given in university prospectus. The required and elective courses are offered in a logical sequence that grooms the students to obtain the program's defined objectives and outcomes. The courses offered outside the department belongs to Faculty of Basic Sciences and Faculty of Electrical Engineering. The Engineering program coordinator, coordinates with the respective coordinator in both the faculties and accommodate the desired courses in program's time table. This is done well in advance prior to the commencement of classes to avoid any clashes in the schedule.

Standard 4-2 Courses in the major area of study must be structured to ensure effective interaction between students, faculty and teaching assistants.

All courses in the program are taught by the faculty member(s) as per HEC approved loading. Courses are structured in the board of studies before commencement of each semester. Faculty members interact frequently among themselves and with students. Students are encouraged to participate in providing feedback and their views about course contents during and after the classes.

Standard 4-3 Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choices.

Students are informed about the program requirements at the start of the session during orientation week by in-charge program and QEC staff. Session coordinator acts as advisor to guide students to choose appropriate courses and also provide guidance on different issues. He/she also maintain a list of guidance points provided to students during the semester and program, which is being evaluated at the end of the program to take necessary improvement.

Session coordinator provides professional counseling to students when needed. Students can get in touch directly with him/her for any advice.

Director Student Affairs arranges industrial tours for students to improve their subject vision and technical know-how. He also invites professionals from different industries to conduct interactive sessions with students for advice on professional matters/future career planning.

Program coordinator maintains a list of professional societies and technical bodies, that is provided to students on demand and students can get membership of such organizations on individual basis.

Criterion 5: Process Control

Standard 5-1 The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

The program has a well-defined admission criterion, which include evaluation of student's marks at different levels and admission test results. The admission is done once a year, in fall semester.

Student who have scored more than 60% marks in SSC and HSSC examination (pre-engineering group) or A-levels or International Baccalaureate Advanced Placement with Physics, Chemistry and Mathematics or BS Physics/Chemistry and Mathematics or Diploma of Associate Engineering in Mechanical, are eligible to appear in the admission test of the program. Admission is granted strictly on the basis of academic record and admission test.

Students from accredited universities are eligible to transfer their credits to HITEC. Students have to submit complete course curriculum and internal evaluation certificate of each subject from his/her previous institution duly signed by head of department/principal. Student's applications in this regard are dealt on case to case basis. Such applications are discussed in Board of Studies to evaluate them and make decision. Dean of the faculty is the final authority to make decision regarding credit transfers.

This admission criterion is evaluated every 2 years by the board of faculties and academic council in the light of instructions issued by PEC and HEC. Minor internal adjustments regarding admission test result weight-ages or test contents are made.

Standard 5-2 The process by which students are registered in the program and monitoring of students' progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

The student's name, after completion of the admission process, is forwarded by the Registrar office for registration in the specific program and the registration number is issued.

Students are evaluated through assignments, Sessional and final examinations at the end of each semester. The laboratory work is done on regular basis as per schedule and contributes significantly towards the student's evaluation for relevant course. Only qualified students in each semester are allowed to join the next semester.

Standard 5-3 The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting with its objectives.

Vacant and newly created positions are advertised on the university website and also in the national newspapers, applications are received by the Registrar office, scrutinized by the respective Deans, and call letters are issued to the short-listed candidates on the basis of experience, qualification, publications and other qualities/activities as determined by the University in the light of HEC guidelines.

The candidates are interviewed by the University Selection Board. Selection of candidates is approved by the BOG. Induction of new candidates depends upon the number of approved vacancies.

Faculty members are retained by giving them good remuneration, favorable teaching environment, research facilities and management support.

On semester basis faculty performance is evaluated basing on HEC Performa number 10 by the students, HOD recommendations and with the counter signature of Dean and Vice Chancellor. The additional annual increment is based on the recommendations of the HOD, Dean and the Vice Chancellor.

Standard 5-4 The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

Students are the recipient of the delivery of course material, through their teachers. The program is actively evaluated by HOD, Dean, In Charge program and QEC. The feedback of the taught course is best instrument to measure that the course learning outcomes are met. The students give feedback on Performa number 1 regarding course contents and how it was delivered. Through Performa number 10, students evaluate and comment on teacher's efforts, put in to deliver the course contents, his general conduct in the class, the environment, he/she, maintains and extra efforts, he/she makes to satisfy students, thirst for knowledge.

Faculty feedback is also taken on HEC Performa number 2 (Faculty Course Review Report – Annexure L) and Performa number 5 (Faculty Survey – Annexure - G) which is a very useful activity to evaluate the course contents, learning and teaching environments and overall teachers satisfaction level. Course evaluation by teachers

also indicates what percentage of desired outcome has been achieved by the course contents and what needs to be improved or changed.

This exercise is done twice a year. The feedback is discussed with HOD, Dean and In-charge program, who focus on making improvements in the weak areas, identified by the students. Teacher's evaluation Performa's are fed to the computer and bar charts are made. Each teacher is graded out of 5 marks. The comparative bar charts indicate level of performance of teachers, as visualized by the students. QEC formally submits these bar charts to HOD, Dean and Vice Chancellor for their information and taking of necessary corrective actions.

Standard 5-5 The process that ensures that graduates have completed the requirements of the program must be based on standards, effective and clearly documented procedures. This process must be periodically evaluated to ensure that it is meeting its objectives.

The program is run on semester basis and at the end of each semester examinations are held to evaluate the students' progress in that semester. Qualified students are allowed to join next semester and this cycle continues till the end of 8th semester which is the final semester. At the end of 8th semester all students are required to submit their respective projects. Student's final results are announced on the basis of projects results and examination results.

Requirements of this standard are met through by 3 Performas issued by HEC. The feedback is documented and its evaluation indicates degree of satisfaction of the graduates. Three forms (Performa 3, Survey of Graduating Students (Annexure-F), Performs 7, Alumni Survey (Annexure-A) and Performa 8, Employer Survey (Annexure-B)) are extremely good instruments to measure the program outcomes.

The feedback is taken on yearly basis. The suggestions given by the graduating students and graduates working in the industry are given due weight-age. For example a few graduates through Alumni survey indicated that design aspect in mechanical engineering may be increased by 5 percent. The proposal is being evaluated by Board of Faculty of the Mechanical Engineering program and recommendations are being made to Academic Council to grant approval for change in syllabi.

The feedback of employers has been achieved. Generally, they are satisfied; however, they have recommended that graduates be given more practice in technical report writing, presentation skills and ability to design system components. This is also being processed to make changes in syllabi.

Criterion 6: Faculty

Standard 6-1 There must be enough full time faculties who are committed to the program to provide adequate coverage of the program areas/courses with

continuity and stability. The interests and qualifications of all faculty members must be sufficient to teach all courses, plan, modify and update courses and curricula. All faculty members must have a level of competence that would normally be obtained through graduate work in the discipline. The majority of the faculty must hold a Ph.D. in the discipline.

There are four PhD faculty members, specialist in the fields of composite materials, fluid mechanics and thermodynamics. Including these following ranks are available in the mechanical department:-

- Professor – 2
- Associate Professor – 2
- Assistant Professor – 10
- Lecturer – 11
- Lab Engineers - 3

Program Area of Specialization	Courses in the area and average number of sections per year			Number of faculty members in each area	Number of faculty with Ph.D. Degree
Mechanical	1.	ME-101	Workshop Technology	*	-
	2.	ME-102	Thermodynamics-I	-	*
	3.	ME-103	Fluid Mechanics-I	-	*
	4.	ME-104	Engineering Drawing & Graphics	1	-
	5.	ME-105	Engineering Statics	-	1
	6.	ME-201	Engineering Dynamics	*	-
	7.	ME-202	Material Science & Engineering	*	*
	8.	ME-203	Fluid Mechanics-II	-	1
	9.	ME-204	Thermodynamics-II	-	1
	10.	ME-205	Mechanics of Material-I	-	*
	11.	ME-206	Heat & Mass Transfer	-	*
	12.	ME-301	Mechanics of Material-II	-	1
	13.	ME-302	Theory of Machines	*	-
	14.	ME-303	Manufacturing Process	1	-
	15.	ME-304	Design of Machine Elements-I	*	-
	16.	ME-305	Refrigeration & Air Conditioning	1	-
	17.	ME-306	I.C. Engines	*	-
	18.	ME-307	Mechanical Vibration	1	-
	19.	ME-308	Design of Machine Elements-II	1	-
	20.	ME-402	Power Plant	*	-
	21.	ME-403	Control Systems	1	-
	22.	ME-404	CAD/CAM	*	-

	23.	ME-405	Instrumentation & Measurements	1	-
	24.	ME-407	Health Safety and Environment	*	
Total	**27**			**7**	**4**
* Overlapped courses i.e. faculty teaching other courses also teach these courses					

Table 13: Courses Taught vs. Availability of Faculty

Table 14 shows the same for the elective / optional courses:-

Program Area of Specialization	Elective Courses			Number of faculty members in each area	Number of PhD faculty
Mechanical Engineering	1.	ME 410	Gas Dynamics	*	*
	2.	ME 411	Computational Fluid Dynamics	-	*
	3.	ME 412	Industrial Engineering	-	-
	4.	ME 413	Finite Element Analysis	-	-
	5.	ME 414	Automation and Robotics	*	-
	6.	ME 415	Optimization	-	-
	7.	ME 416	Renewable Energy Resources	1	-
	8.	ME 418	Tribology	*	-
	9.	ME 419	Combustion Modeling	*	-
	10.	ME 420	Industrial Automation	*	-
	11.	ME 421	Advanced Manufacturing Techniques	*	-
	12.	ME 422	Advanced Stress Analysis	*	*
	13.	ME 423	Experimental Stress Analysis	*	*
	14.	ME 424	Experimental Techniques & Methods	*	*
	15.	ME 425	Engineering Entrepreneurship	-	-
	16.	ME 426	Mathematical Modeling & Simulation	-	*
	17.	ME 427	Robotics	*	-
	18.	ME 428	Maintenance Engineering	-	*
Total	18			1	

* Faculty teaching other courses can also teach these courses

Table 14: Elective Courses vs. Availability of Faculty

The ratio of faculty viz-ã-viz courses being taught is satisfactory. The present faculty is in position to take up all courses of under graduate as well as post graduate students. Each faculty member is assigned subjects along with approved syllabus at the beginning of the semester. The faculty member prepares lecture plans and delivers to his / her students. Remaining restricted to the approved syllabus, the faculty member can update the already taught subject material according to the current developments in the field. Thus students are kept updated to the latest developments. Each faculty member is assigned access to the internet. Time table is scheduled in such a way so as to provide enough time to each teacher for research work. The courses being taught and commitment of the faculty is shown in the
Table 13 for prescribed regular courses.

Standard 6-2 All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place. Effective Programs for Faculty Development

University has an efficient and committed faculty. Each faculty member is assigned to teach subjects according to the syllabus prescribed in the light of HEC and PEC directives. Every faculty member is provided an opportunity at the end of semester through faculty satisfaction report to evaluate his/her performance and comment on the suitability of the contents of curriculum being taught by him according to the latest trends / developments. If deemed necessary, suitable changes to the curricula are made by a board in the light of the suggestions of the concerned faculty member.

The university has organized groups for research in different fields of engineering. Group members are chosen according to their interest in a particular field of engineering. Each group is headed by an experienced / senior teacher. Group members are motivated for research in their respective fields and participate in international technical publications. University encourages the researchers by providing them a nominal amount after publication of research paper.

Enough time is provided to the faculty members for devoting their time to research in their fields. The faculty members are assisted by university through provision of internet facility and library.

Standard 6-3 All faculty members should be motivated and have job satisfaction to excel in their profession.

Students' feedbacks about their teachers are received after termination of each semester. Basing on these feedbacks, faculty members graded best by their students are awarded with appreciation letters. Letter of caution is served to the faculty member with whom students are not satisfied.

The faculty survey as per Performa prescribed by HEC is evaluated and basing on the inputs of the Performa, the system is further improved to provide beneficial teaching / learning environment. Faculty Surveys results are attached as per Annexure G.

Criterion 7: Institutional Facilities

Standard 7-1 The institution must have the infrastructure to support new trends in learning such as e-learning.

The university has provided e-learning facilities to faculty members and students. Students have been provided a number of computer systems in the library to access e-learning section. Every student has been provided with user ID to access the e-learning resources from within the university library.

The support staff to look after the e-learning resources is sufficient in number, trained and responsive. The university has provided enough funding to support the e-learning.

Standard 7-2 The library must possess an up-to-date technical collection relevant to the program and must be adequately staffed with professional personnel.

The university library has enough technical books in hard copies to support the program learning. The library is staffed with more than 9 professionals to help students and faculty members to get access to required book or learning material efficiently.

Standard 7-3 Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities.

Enough class rooms are available to run the program as per desired schedule

Criterion 8: Institutional Support

Standard 8-1 There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.

University allocates enough financial resources each year to hire competent faculty as required.

As already listed in standard 5-3, Faculty members are retained by giving them favorable teaching environment and management support.

As listed in standard 6-2, Faculty members are provided with adequate resources for research and academic activities to maintain their competence. Faculty members have access to the internet and library materials for academic and research activities. Professional training is also provided to faculty if required to enhance their capabilities.

Standard 8-2 There must be an adequate number of high quality graduate students, research assistants and Ph.D. students.

The university follows the guidelines of PEC for admission in this program. The number of graduate students during the last three years is 28 with no research assistants and 6 Ph. D students in the faculty.

Faculty to graduate student's ratio for the last three years remained in the range of 2:1.

Standard 8-3 Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.

Library at HITEC holds more than 33000 books for all programs. Sufficient numbers of computers are available to be used by the students. Library is organized to accommodate 200 students at a time.

Laboratories at HITEC holds adequate equipment to be used by the students to carry out desired experiments and laboratory work. Each year a handful of budget is allocated for laboratories to maintain and upgrade the equipment and other facilities.

Computing facilities at HITEC provide excellent platform to students to enhance their learning capabilities. There are 8 computer laboratories in Faculty of computing, which are accessible to all students for their use.

Conclusion

The self-assessment report of the Faculty of Mechanical Engineering, HITEC University, Taxila is an important document, which gives strengths and weaknesses of the program. The management is striving hard to improve infrastructure for establishment of conducive environment for studies. The faculty is focused on imparting quality education, introduction of new and innovative techniques and conduct of quality research to produce competent engineers. The report has been prepared after evaluating the program in the light of 8 criterion and 31 standards given in HEC's Self-Assessment Manual. The program mission objectives and outcomes are assessed and strategic plans are presented to achieve the goal, which are again measurable through definite standards. Teachers' evaluation revealed satisfactory standards, the score of twenty nine teachers of the program ranged from 2.64 to 4.74. Students' course evaluation score ranged between 2.79 and 4.55 with a mean of 3.80 points in 0-5 scale. Alumni surveys revealed variable results with regards to knowledge, interpersonal skills, management and leadership skill. Weaknesses are identified which are related to space, laboratories and equipment. Improvements in curriculum design and infrastructure are suggested which are based upon set, well defined and approved criteria. Pre-requisites are fully observed, examinations are held on schedules, academic schemes are prepared well in advance, transparent admission, registration and recruiting policy are some of the strong areas of this program. The number of courses along with titles and credit hours for each semester, course contents for degree program, is thoroughly planned. Their efficacy was measured through different standards and it was found to be satisfactory.

The facilities and shortcomings in the laboratory have been discussed. It was concluded that laboratory facilities and class rooms need further improvement. The need of refresher courses for the fresh faculty on method of teaching cannot be over emphasized.

Proper steps are taken to guide the students for program requirements, communication, meetings, tutorial system, tours, students-teacher interaction etc. Some improvements have been suggested. As regards the process control covering admission, registration, recruiting policy, courses and delivery of material, academic requirements, performance and grading, university, PEC as well as Higher Education Commission have set forth proper rules, which are properly followed. At present there are nineteen faculty members who are highly qualified in their fields. However, faculty members need motivation for advanced knowledge, research and external training.

Institutional facilities were measured through Criterion 3; infrastructure, library, class room and faculty offices and in each case, short comings and limitation are highlighted. Institutional facilities need to be strengthened. Accordingly, institutional support will greatly promote and strengthen academic, research, management and leadership capabilities.

In conclusion, the strong and weak areas of the program are as under:

Strong Areas

- Curriculum Design, development and organization are based upon set, well defined and approved criteria
- Pre-requisites fully observed
- Rigorous, intensive and rewarding program
- Capable Faculty

- Examinations on schedule.
- Academic Schemes fully prepared in advance
- The number of courses along with their titles and credit hours for each semester, course contents for degree program are fully planned
- Transparent admission, registration and recruiting policy
- PEC & HEC rules fully followed

Weak Areas

- Insufficient infrastructure
- Low number of industry-oriented courses
- Low number of design competitions and intra-university linkages
- Class rooms improvements
- New & State of the art equipment for Labs
- Faculty training and development courses for faculty members

Salient recommendations of self-assessment team are:

Class room Improvement

Insufficient Infrastructure

Laboratory Equipment

Regular Teacher Training

Facilities for Students

Faculty Development

Syllabi Review

Annexure – A: Research Papers List

FACULTY PUBLICATIONS

Dr. S.KAMRAN AFAQ

Journal Papers

1. "Synergistic effect of aluminum trihydrate and zirconium hydroxide nanoparticles on mechanical properties, flammability, and thermal degradation of polyester/jute fiber composite", Mohsin Ejaz, Muhammad Muzammil Azad, Atta ur Rehman Shah, **S. Kamran Afaq** & Jung-il Song, **Cellulose** (2022), https://doi.org/10.1007/s10570-022-04417-9.
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3. "An Expert System for Rotating Machine Fault Detection Using Vibration Signal Analysis", Ayaz Kafeel, Sumair Aziz, Muhammad Awais, Muhammad Attique Khan, **Kamran Afaq**, Sahar Ahmed Idris, Hammam Alshazly, Samih M. Mostafa, **Sensors**, Volume 21, Issue 22, **2021.**
4. "Mechanical and Biodegradable Properties of Jute/Flex Reinforced PLA Composites", M Ejaz, M M Azad, AR Shah, **S. Kamran Afaq**, JI Song, **Fibers and Polymers**, Volume 21, pp 2635-2641, **2020**.
5. "Numerical and experimental investigation of the effect of process parameters on sheet deformation during the electromagnetic forming of AA6061-T6 alloy" Zarak Khan, Mushtaq Khan, Syed Husain Imran Jaffery, Muhammad Younas, **Kamran S. Afaq**, and Muhammad Ali Khan, Mechanical Sciences, 11, 329-347, **2020**.
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11. “Age effect on the mechanical properties of hip joint bone: An Experimental Investigation” Rafiullah Khan, Waseem ur Rehman, Misbah Ullah, **Kamran Afaq** et al., Journal of Engineering and Applied Sciences, Vol. 35, No.1, **2016**.
“Finite element analysis of a composite VAWT blade”, M. Saqib Hameed, **S. Kamran Afaq** et al, Ocean Engineering, Volume 109 (**2015**), page 669-676.
12. “Cycle Time Reduction in Injection Molding Process by Selection of Robust Cooling Channel Design”, Muhammad Khan, S. Kamran Afaq, NizarUllah Khan, and Saboor Ahmad, ISRN Mechanical Engineering, **2014**.
13. “Design and analysis of a straight-bladed vertical axis wind turbine blade using analytical and numerical techniques”, M. Saqib Hameed, **S. Kamran Afaq**, Ocean Engineering 57 (**2013**) 248–255.
14. “A new theory for laminated composite plates”, KARAMA Moussa, **K S AFAQ**, MISTOU Sébastien, Proc. IMechE, Part L: J. Materials: Design and Applications, DOI 10.1243/14644207JMDA189, p223, Ed. Professional, ISSN 1464-4207, **2008**.
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2. “Optical and Thermal Analysis of a Flat Plate Solar Collector using Water and Alumina Nano Fluids”, IEEE, International Conference on Applied and Engineering Mathematics (ICAEM), **2019**.
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Dr. Saad Arif

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Dr. Zarak Khan

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Annexure – B: Faculty Resume

List of Departmental Teaching Faculty, sorted by Designation										
Sr. No.	Name	PEC No.	Designation	Joining Date	Details of Qualifications			Specialization	Experience Teaching + Research (Total) Years	Dedicated / Shared
					DE	Year	University			
1	Dr. S. Kamran Afaq	MECH/ 10975	Professor & Dean	13-09-2009	PhD	2003	University Paul Sabatier, Toulouse III, France	Mechanical Engineering	30	Dedicated
					MS	2000		Mechanical Engineering		
					BS	1992	NED, Karachi	Mechanical Engineering		
2	Dr. Liaqat Ali	MECH/ 11466	Professor & Chairperson	07-10-2019	PhD	2006	Loughborough University, Leicestershire UK	Mechanical Engineering	27	Dedicated
					MS	2002	University of Manchester, UK	Mechanical Engineering		
					BS	1994	UET Peshawar	Mechanical Engineering		
					MS	2006	UET Taxila	Mechanical Engineering		
					BS	2004	UET Taxila	Mechanical Engineering		
3	Dr. Khalid Mahmood	MECH/ 8874	Associate Professor	01-02-2021	PhD	2012	University of Manchester	Mechanical Engineering	32	Dedicated
					MS	2001	UET Peshawar	Mechanical Engineering		
					BS	1989	UET Lahore	Mechanical Engineering		
4	Dr. Fahad Sarfraz Butt	Aero/2756	Associate Professor	12-07-2011	PhD	2011	University of Manchester, UK	Computational Fluid Dynamics	11	Dedicated
					MS	2006	ENSAE, France	Aeronautical Engineering		
					BS	2000	GC University, Lahore	Physics		
5	Dr. Muhammad Farhan Ausaf	MECH/ 21098	Assistant Professor	10-09-2008	PhD	2014	HUST, China	Manufacturing Automation	17	Dedicated
					MS	2004	PIEAS	Process Engineering		
					BS	2002	UET Peshawar	Mechanical Engineering		
6	Dr. Muhammad Zahid Iqbal	MECH/ 19364	Assistant Professor	20-02-2017	PhD	2016	City university, Hong Kong	Computational wind engineering	12	Dedicated

					MS	2011	UET Lahore	Thermal power Engineering		
					BS	2005	UET Taxila	Mechanical Engineering		
7	Dr. Tanveer Ahmed	MECH/ 25283	Assistant Professor	03-09-2012	PhD	2019	CEME, NUST	Mechanical Engineering	35	Dedicated
					MS	2002	CEME, NUST	Mechanical Engineering		
					BS	1991	UET Lahore	Mechanical Engineering		
8	Dr. Syed Maaz Hasan	MECH/ 22952	Assistant Professor	22-10-2010	Ph. D.	2019	CEME, NUST	Mechanical Engineering	12	Dedicated
					MS	2012	CEME, NUST	Mechanical Engineering		
					BS	2010	CEME, NUST	Mechanical Engineering		
9	Dr. Luqman Ahmad Nizam	MECH/ 22895	Assistant Professor	02-09-2013	PhD	2020	UET Taxila	Mechanical Engineering	9	Dedicated
					MS	2013	UET Taxila	Mechanical Engineering		
					BS	2010	UET Taxila	Mechanical Engineering		
10	Mr. Syed Adeel Akhtar Shah	Non Engg Faculty	Assistant Professor	14-09-2009	MA	1996	University of Peshawar	English Language & Literature	25	Dedicated
					MBA	2000	Preston University, Islamabad	Marketing		
					LLB	2006	University of Peshawar	Law		
11	Maj (R) Athar Hameed	MECH/ 7749	Assistant Professor	02-09-2013	Ph. D.	-	(In Progress) UET Taxila	Mechanical Engineering	32	Dedicated
					MS	2013	UET Taxila	Mechanical Engineering		
					BS	1989	UET Peshawar	Mechanical Engineering		
12	Col (R) Abdul Aleem	MECH/ 4025	Assistant Professor	20-02-2017	MS	2000	UET Taxila	Mechanical Engineering	41	Dedicated
					BS	1981	UET Lahore	Mechanical Engineering		
13	Dr. Saad Arif	MECHATRO/331	Assistant Professor	14-02-2011	PhD	2021	SMME NUST	Robotics and Intelligence Machines Engineering	12	Dedicated
					MS	2012	CEME NUST	Mechatronics Engineering		
					BE	2009	Air University	Mechatronics Engineering		
14	Dr. Zarak Khan	MECH/ 25056	Assistant Professor	29-08-2013	PhD	2021	SMME, NUST	Design & Manufacturing	9	Dedicated

					MS	2015	SMME, NUST	Design & Manufacturing		
					BS	2012	HITEC University	Mechanical Engineering		
15	Mr. Moeen Mahboob	MECHATRO/1272	Lecturer	09-02-2013	PhD	-	In Progress (HITEC)	Mechanical Engineering	11	Dedicated
					MS	2015	CEME, NUST	Mechatronics Engineering		
					BE	2010	Air University	Mechatronics Engineering		
16	Mr. Imran Sajid Shahid	MECH/18663	Lecturer	02-09-2013	PhD	-	(In Progress) HITEC University	Mechanical Engineering	14	Dedicated
					MS	2016	HITEC University	CFD		
					BS	2005	UET Taxila	Mechanical Engineering		
17	Mr. Yasir Hamid	MECH/26254	Lecturer	24-09-2013	PhD	-	(In Progress) SMME, NUST	Design and Manufacturing Engineering	8	Dedicated
					MS	2017	HITEC University	Mechanical Engineering		
					BS	2013	HITEC University	Mechanical Engineering		
18	Mr. Sardar Shahbaz Ali Naqvi	MECH/26907	Lecturer	18-02-2018	PhD	-	(In Progress) University of Wah	Economics	8	Dedicated
					MS	2016	SMME, NUST, Islamabad	Mechanical Engineering		
					MS	2020	IIUI, Islamabad	Supply Chain Management		
					BS	2013	HITEC University	Mechanical Engineering		
19	Mr. Muhammad Mahad Shah	MECH/29001	Lecturer	15-09-2017	PhD	-	(In progress) SMME, NUST	Mechanical Engineering	6	Dedicated
					MS	2016	SMME, NUST, Islamabad	Mechanical Engineering		
					BS	2014	HITEC University	Mechanical Engineering		
					BS	2014	SMME, NUST, Islamabad	Mechanical Engineering		
20	Miss Munazza	MECH/22072	Lecturer	20-02-2012	MS	2016	UET Taxila	Energy Engineering	10	Dedicated
					BS	2009	UET Taxila	Mechanical Engineering		
21	Miss Atiya Sadiq	MECH/21720	Lecturer	01-12-2010	MS	2021	UET Taxila	Thermal System Engineering	11	Dedicated

					BS	2009	UET Taxila	Mechanical Engineering		
22	Mr. Sardar Muhammad Aneeq Khan	MECH/ 27866	Lecturer	05-10-2017	MS	2020	HITEC University	Mechanical Engineering	5	Dedicated
					BS	2013	HITEC University	Mechanical Engineering		
23	Mr. Bilal Haider	MECH/ 26435	Lecturer	13-12-2019	MS	2019	UET Taxila	Applied Mechanics and Design	3	Dedicated
					BS	2013	HITEC University	Mechanical Engineering		
24	Mr. Ghulam Mubasher	-	Lecturer	13-10-2020	MS	2017	Foundation University	Linguistics	14	Dedicated
					M.A	2008	Punjab University	English		
25	Mr. Muhamad Ammar Akram	MECH/ 35437	Lecturer	13-09-2019	PhD	-	USPCASE NUST	Thermal Energy Engineering	3	Dedicated
					MS	2019	UET Taxila	Mechanical Engineering		
					BS	2017	HITEC University	Mechanical Engineering		
					BS	2018	HITEC University	Mechanical Engineering		
					BS	2020	HITEC University	Mechanical Engineering		
26	Mr. Hammad Ahmad	MECH/ 39987	Lab Engineer	13-09-2021	Phd	In prog	HITEC University	Mechanical Engineering	1	Dedicated
					MS	2021	HITEC University	Mechanical Engineering		
					BS	2018	HITEC University	Mechanical Engineering		
27	Mr. Muhammad Hammad Asghar	MECH/ 51589	Lab Engineer	30-09-2022	BS	2022	HITEC University	Mechanical Engineering	0	Dedicated
28	Mr. Abdul Wahab	Applie d For	Lab Engineer	06-10-2022	BS	2022	HITEC University	Mechanical Engineering	0	Dedicated

Annexure – C: Lab Safety Precautions

- Wear safety glasses or face shields when working with hazardous materials and/or equipment.
- Wear gloves when using any hazardous or toxic agent.
- Clothing: When handling dangerous substances, wear gloves, laboratory coats, and safety shield or glasses. Shorts and sandals should not be worn in the lab at any time. Shoes are required when working in the machine shops.
- If you have long hair or loose clothes, make sure it is tied back or confined.
- Keep the work area clear of all materials except those needed for your work. Coats should be hung in the hall or placed in a locker. Extra books, purses, etc. should be kept away from equipment, which requires air flow or ventilation to prevent overheating.
- Disposal - Students are responsible for the proper disposal of used material if any in appropriate containers.
- Equipment Failure - If a piece of equipment fails while being used, report it immediately to your lab assistant or tutor. Never try to fix the problem yourself because you could harm yourself and others.
- If leaving a lab unattended, turn off all ignition sources and lock the doors.
- Never pipette anything by mouth.
- Clean up your work area before leaving.
- Wash hands before leaving the lab and before eating.
- When using compressed air, use only approved nozzles and never directs the air towards any person.
- Guards on machinery must be in place during operation.
- Exercise care when working with or near hydraulically- or pneumatically-driven equipment. Sudden or unexpected motion can inflict serious injury.
- Never do unauthorized experiments.
- Never work alone in laboratory.
- Keep your lab space clean and organized.
- Do not leave an on-going experiment unattended.

- Always inform your instructor if you break a thermometer. Do not clean mercury yourself!!
- Never taste anything. Never pipette by mouth; use a bulb.
- Never use open flames in laboratory unless instructed by TA.
- Check your glassware for cracks and chips each time you use it. Cracks could cause the glassware to fail during use and cause serious injury to you or lab mates.
- Maintain unobstructed access to all exits, fire extinguishers, electrical panels, emergency showers, and eye washes.
- Do not use corridors for storage or work areas.
- Do not store heavy items above table height. Any overhead storage of supplies on top of cabinets should be limited to lightweight items only. Also, remember that a 36" diameter area around all fire sprinkler heads must be kept clear at all times.
- Areas containing lasers, biohazards, radioisotopes, and carcinogens should be posted accordingly. However, do not post areas unnecessarily and be sure that the labels are removed when the hazards are no longer present.
- Be careful when lifting heavy objects. Only shop staff may operate forklifts or cranes.
- Clean your lab bench and equipment, and lock the door before you leave the laboratory.

Annexure – D: Employer Satisfaction Survey

Form No. QAC-04

HITEC UNIVERSITY TAXILA
DIRECTORATE OF QUALITY ASSURANCE & COLLABORATION

Name: _____ **Registration No:** _____

Department: _____ **Contact Number:** _____

Contact Email: _____

EXIT SURVEY OF GRADUATING STUDENTS

Congratulations for completing Bachelor Studies in a discipline of your choice. HITEC University wishes to ascertain your level of satisfaction about the teaching/learning processes you went through as a HITONIAN. We value your input to further improve the quality of education.
Please indicate your level of satisfaction in the following questions as:

1: Highly Unsatisfied, 2: Unsatisfied, 3: Uncertain, 4: Satisfied, 5: Highly Satisfied.

Questions	Score
1. Are you satisfied with the theoretical and practical knowledge gained in the program?	
2. Is the program effective in developing analytical and problem solving skills?	
3. How good are you in using modern IT tools?	
4. Has the program developed independent thinking in you?	
5. Are you satisfied with your communication skills?	
6. Have you understood the basic principles of planning an activity?	
7. Do you think you can effectively work as a member of a team?	
8. Sometimes, engineers are required to make decisions which may not be popular but are based on professional facts. Are you motivated to make such decisions?	
9. Do you believe that continual updating of knowledge is essential for professional improvement?	
10. Is the program too heavy and induces a lot of pressure?	
11. Do you feel the environments were conducive for learning?	
12. Are you satisfied with the infrastructure of the department?	
13. Are you satisfied with the co-curricular and extra-curricular activities?	

14. Any additional observations and comments you like to share with us:

Annexure – E: Course Evaluation Survey

Form No. QAC-02

HITEC UNIVERSITY TAXILA
DIRECTORATE OF QUALITY ASSURANCE & COLLABORATION

Course Evaluation Form

(To be filled by the student)

Department:_____ **Semester:**_____

Course Title: _____**Instructor Name:** _____

Student Name & Registration No. (Optional): _____.

Please indicate your level of satisfaction by assigning a number to each of the following statements as given below:-

1: Highly Unsatisfied 2: Unsatisfied, 3: Uncertain, 4: Satisfied, 5: Highly Satisfied

Statements	Score
1. The Class Room facilities and overall environment were conducive to learning.	
2. The recommended Textbook was student-friendly i.e. a student can easily follow it after attending the class lecture.	
3. The library resources, i.e. other books, internet facility, magazines etc. were adequate in supporting the learning.	
4. The concepts were clearly explained.	
5. The course created interest in me to know more about it.	
6. Quizzes, Sessionals and Assignments etc. were helpful in learning this course.	
7. The lab experiments were synchronized with the theory classes.	
8. The lab experiments were helpful in learning the subject.	
9. The lab support was satisfactory.	
10. The course workload was manageable.	
11. I had the knowledge of pre-requisite subjects and mathematics for this course.	Yes/No

Any additional comments:

Annexure – F: Teacher Evaluation Survey

Form No. QAC-01

HITEC UNIVERSITY TAXILA
DIRECTORATE OF QUALITY ASSURANCE & COLLABORATION

Teacher Evaluation Form
(To be filled by the student)

Semester: _____

Student Name & Registration No. (Optional): _____.

Please indicate your level of satisfaction by assigning a number to each of the following statements as given below:-

1: Highly Unsatisfied 2: Unsatisfied, 3: Uncertain, 4: Satisfied, 5: Highly Satisfied

Statements	Score
1. The teacher distributed the course plan well in time for the current semester.	
2. The course plan contained objectives, topics, Course Learning Outcomes (CLOs), Grading policy etc.	
3. The teacher was punctual.	
4. The teacher communicated the subject matter clearly and effectively and solved sufficient examples.	
5. The teacher encouraged class participation.	
6. The teacher was fair in marking exam papers.	
7. The teacher returned all marked quizzes, assignments, sessionals etc. in reasonable amount of time.	
8. The teacher was available for consultation during the specified visiting hours.	
9. The teacher encouraged students to use Library resources to supplement learning of course topics.	
10. The teacher covered all topics as given in the course plan.	
11. The teacher clearly indicated those questions which were meant for CLOs evaluation.	
12. The teacher encouraged innovative thinking.	
13. You want to be taught by this teacher in the next semester	

Comments:

Annexure – G: Alumni Survey

The Department was able to collect responses from DME alumni. Participants were asked different questions on the quality of education they received and the level of participation they had at the Department. The purpose of this survey is to access the quality of the academic program and determine the achievement of PEOs. The record of survey is maintained in the departmental database and summarized. The form, and the results are as follows:

Form No. QAC-05

HITEC UNIVERSITY TAXILA
DIRECTORATE OF QUALITY ASSURANCE & COLLABORATION

ALUMNI FEEDBACK FORM

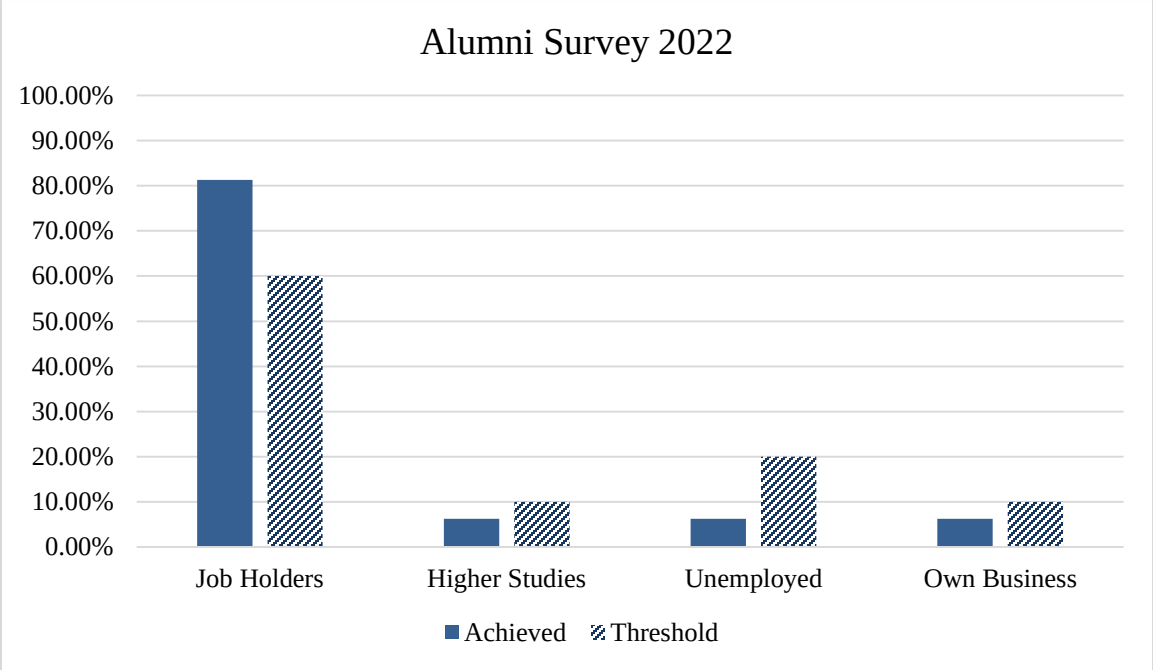
Name:					
Alumni No**:**			Graduating Year**:**		
Present Address**:**					
Email:					
Present Status:	• Job Holder	• Higher Studies	• Unemployed	• Own Business	• Internship
Present Employer:					
Present Employer Address: ***(Contact Number, Email & Mailing Address)***					

Please tick (√) one of the three choices:

1. Did you get your first job after graduation within:-		
1st year	*1 – 2 years*	*2 – 3 years*
2. To what extent you apply the knowledge gained at HITEC University in your profession?		
Sparingly	*Sometimes*	*Extensively*
3. Have you been appreciated for making any innovative suggestions towards your professional activity?		
Not, so far	*Only once*	*More than one time*
4. Did you get the chance to attend a professional short-course / seminar/ workshop so far?		
No	*Only once*	*More than one time*
5. Do you feel the need for updating your professional knowledge on self-help basis even if you have not attended any short-course / seminar /workshop?		
I do not feel the need	*Sometimes I do feel the need*	*I continuously update myself*
6. A professional engineer is an important person of the society he lives in. Do you remain mindful of societal issues while exercising your profession?		
Sometimes I have to be mindful	*Most of the times I have to be mindful*	*I am always mindful of this aspect*
7. An engineer has to deal with his superior / colleagues / subordinates etc. Do you conduct yourself in a supportive manner?		
Sometimes	*Most of the times*	*Always*
8. Did you ever get the experience of working in a multidisciplinary team to create a solution of an engineering problem?		
Sparingly	*Sometimes*	*Extensively*
9. Did you get a chance to lead and manage a team of employees in developing a solution to an engineering problem?		
Opportunity Awaited	*Only Once*	*More than once*
10. Have you been involved in any informal activity, other than your profession?		
None	*Social activity*	*Community service, charity*
11. Please indicate your satisfaction to the appropriateness of the above mentioned questions. To make your feedback more comprehensive, we welcome your suggestions:		

Alumni Survey Data 2022

Alumni Survey 2022					
Department	**Job Holders**	**Higher Studies**	**Unemployed**	**Own Business**	***Total***
Mechanical	**81.25%**	**6.25%**	**6.25%**	**6.25%**	**100%**
Threshold (Mechanical)	**60%**	**10%**	**20%**	**10%**	**100%**



Alumni Survey comparison chart

Annexure – H: Assessment Team (AT) Findings

Self Assessment Team Report Submission

30th May 2023

Self Assessment Program

Self Assessment Objectives

Self Assessment Team

Conclusions of SAR

Strong Areas

Weak Areas
Class room Improvement

Insufficient Infrastructure
Laboratory Equipment

Regular Teacher Training

Facilities for Students

Faculty Development

Syllabi Review

Annexure – I: Implementation Plan

Annexure – J: Faculty Course Review Report

Faculty of Mechanical Engineering is running 38 core courses for the B.S. Mechanical Engineering program. All courses curriculum is reviewed periodically by the faculty to assess its effectiveness and contribution in achieving program objectives. Course review also contributes towards making any changes in the syllabi and enhancements required in areas identified as a result of Alumni Survey, Employer Survey and Graduating Students Feedback.

PT members launched HEC Performa 2 (Faculty of Course Review Report) to all the faculty members, to obtain their feedback about courses.

The summary of the overall feedback of all courses identified the following improvement points:

a. Program related to CFD should be added.
b. More Subjects related to Manufacturing side should be introduced.
c. Refinement in course outlines.
d. Students' interest should be addressed by giving options in Elective subjects.
e. Provision to interact more with industrial units during study period.

Annexure – K: Rubric Report