



DEPARTMENT OF MECHANICAL ENGINEERING



Dr. Saif-ur-Rahman
HoD Mechanical Engineering

Department of Mechanical Engineering

BS Mechanical Engineering

Program Educational Objectives

- i. Applies knowledge and skills to provide sustainable solutions to challenging Mechanical Engineering problems in industry and academia.
- ii. Demonstrates professional growth and exhibit continual improvement in learning modern engineering techniques and their applications in practice.
- iii. Makes positive contribution towards society by strong ethical values, communication skills and leadership.

ME Graduate Attributes

- 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 synthesis 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 informed by 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 demonstrate knowledge of and need for sustainable development.
- viii. **[Ethics]** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- ix. **[Individual and Team Work]** 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.



BS Mechanical Engineering

1. Admission Requirements

- a. Higher Secondary School Certificate (FSc Pre-Engineering) or Equivalent with Physics, Chemistry and Mathematics securing at least 60% marks in aggregate.

In case of foreign qualification, equivalence from IBCC will be required.

OR

Diploma of Associate Engineer Examination in relevant discipline securing at least 60% marks in aggregate (up to 2% of maximum allowed seats).

- b. CUST Admission Test or NTS Engineering test.

2. Degree Requirements

Each candidate for the BS Mechanical Engineering degree is required to complete successfully 137 Cr. Hrs. as per the following details.

	Area	Cr. Hrs.
(a)	Foundation Courses	35
(b)	Natural Sciences	20
(c)	Computing	03
(d)	Core Breadth Courses	26
(e)	Core Depth Courses	20
(f)	Humanities	16
(g)	Management Sciences	05
(h)	Inter Disciplinary	03
(i)	Inter Departmental Engineering Elective (IDEE)	03
(j)	Internship	00
(k)	Project	06
	Total	137

(a) Core Courses

Course Title	Code	Cr. Hrs.
Engineering Materials	ME 1413	3
Workshop-I	ME 1801	1
Workshop-II	ME 1811	1
Thermodynamics-I	ME 1113	3
Thermodynamics-II	ME 2123	3
Engineering Drawing & Graphics	ME 1011	1
Engineering Drawing & Graphics Lab	ME 1022	2
Engineering Statics	ME 1213	3
Engineering Dynamics	ME 2223	3
Mechanics of Materials-I	ME 2233	3
Mechanics of Materials-II	ME 3243	3
Fluid Mechanics-I	ME 2513	3
Fluid Mechanics-II	ME 3523	3
Mechanics of Machines	ME 2033	3
Machine Design & CAD-I	ME 3052	2
Machine Design & CAD-II	ME 3063	3
Precision Engineering & Metrology	ME 3312	2
Heat and Mass Transfer	ME 3133	3
Manufacturing Processes	ME 3613	3
Internal Combustion Engines	ME 4142	2
Refrigeration & Air Conditioning	ME 4153	3
Mechanical Vibrations	ME 4253	3
Thermodynamics Lab	ME 2121	1

Engineering Mechanics Lab	ME 2221	1
Mechanics of Machines Lab	ME 2031	1
Mechanics of Materials Lab	ME 3241	1
Fluid Mechanics Lab	ME 3521	1
Machine Design & CAD-I Lab	ME 3051	1
Machine Design & CAD-II Lab	ME 3061	1
Manufacturing Processes Lab	ME 3611	1
Precision Engineering & Metrology Lab	ME 3311	1
Heat and Mass Transfer Lab	ME 3131	1
Internal Combustion Engines Lab	ME 4141	1
Refrigeration & Air Conditioning Lab	ME 4151	1
Mechanical Vibrations Lab	ME 4251	1

(b) Basic Sciences and Inter-Disciplinary

Course Title	Code	Cr. Hrs.
Computer Systems & Programming	CSME 1012	2
Computer Systems & Programming lab	CSME 1011	1
Circuit Analysis I	EEME 2212	2
Circuit Analysis I lab	EEME 2211	1
Basic Electronics	EEME 1222	2
Basic Electronics lab	EEME 1221	1
Control Engineering	EEME 4012	2
Control Engineering lab	EEME 4011	1
Calculus and Analytical Geometry	MTME 1013	3
Applied Differential Equation	MTME 1043	3

Complex Variables and Transforms	MTME 2053	3
Linear Algebra and Numerical Analysis	MTME 2063	3
Engineering Statistics	ME 3073	3
Applied Physics	PHME 1012,	2
Applied Physics lab	PHME 1011	1
Applied Chemistry	CHME 1012	2

(c) General and Management Science Courses

Course Title	Code	Cr. Hrs.
English-I	HMME 1013	3
English-II	HMME 1023	3
English-III	HMME 3033	3
Pakistan Studies	HMME 1002	2
Islamic Studies / Ethics	HMME1012	2
Social Science	HMME 3xx3	3
Management Elective(Engineering Economics)	HMME 3xx2	2
Management Elective -II	HMME 4xx3	3

(d) Elective Courses (Technical)

Students are required to take 09 Cr. Hrs. as elective courses. A list of technical elective courses is given below:

Course Title	Code	Cr. Hrs.
Renewable Energy Technology	ME 4163	3
Power Plants	ME 4173	3
Gas Dynamics	ME 4533	3
Aerodynamics	ME 4543	3
Machining and Automation	ME 4623	3

Introduction to Mechatronics	ME 4423	3
Introduction to Robotics	ME 4443	3
CAD/CAM	ME 4053	3
Computational Fluid Dynamics	ME 4553	3
Finite Element Method	ME 4063	3

(e) Design Project

After the completion of 90 Cr. Hrs. the students are required to demonstrate their practical skills in the field of mechanical engineering by

designing and implementing a design project worth 6 Cr. Hrs. The project shall be completed in two parts as given below:

Course Title	Code	Cr. Hrs.
Design Project-I	ME 4913	2
Design Project-II	ME 4923	4

(f) Industrial Internship (ME4000)

Each student is required to complete an 8-week industrial internship training usually after 6 semesters or on the completion of 90 Cr. Hrs. The internship shall be graded as pass/fail.

(g) Community Work (ME3000)

Each student is required to complete 60 hours community work, usually after 4th semester which would be a prerequisite for the award of degree.

3. Program Duration

This is a four year degree program comprising of 8 semesters. There will be a Fall and a Spring semester in each year. The summer semester will be utilized for internship or deficiency courses. The maximum duration to complete BS Mechanical Engineering degree is 07 years.



Scheme of Study

BS Mechanical Engineering Program

Semester-1 (17 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
MTME 1013	Calculus and Analytical Geometry	Natural Sciences	3	0	3
PHME 1012	Applied Physics	Natural Sciences	2	0	2
PHME 1011	Applied Physics Lab	Natural Sciences	0	3	1
HMME 1013	English – I (Functional English)	Humanities	3	0	3
CHME 1012	Applied Chemistry	Natural Sciences	2	0	2
CSME 1012	Computer System & Programming	Computing	2	0	2
CSME 1011	Computer System & Programming Lab	Computing	0	3	1
ME 1801	Workshop Practice – I	ME Foundation	0	3	1
HMME 1002	Pakistan and Islamic Studies/Ethics	Humanities	2	0	2

Semester-2 (19 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
HMME 1023	English-II (Communications Skills)	Humanities	3	0	3
MTME 1043	Applied Differential Equation	Natural Sciences	3	0	3
ME 1113	Thermodynamics-I	ME Foundation	3	0	3
ME 1011	Engineering Drawing and Graphics	ME Foundation	1	0	1
ME 1022	Engineering Drawing and Graphics Lab	ME Foundation	0	6	2
ME 1213	Engineering Statics	ME Foundation	3	0	3
ME 1811	Workshop Practice – II	ME Foundation	0	3	1
ME 1413	Engineering Materials	ME Foundation	3	0	3

Semester-3 (16 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
MTME 2063	Linear Algebra and Numerical Analysis	Natural Sciences	3	0	3
EEME 2742	Electrical Engineering	IDEE	2	0	2
EEME 2741	Electrical Engineering Lab	IDEE	0	3	1
HMME 1012	Islamic Studies	Humanities	2	0	2
ME 2123	Thermodynamics-II	Breadth	3	0	3
ME 2223	Engineering Dynamics	ME Foundation	3	0	3
ME 2121	Thermodynamics Lab	Breadth	0	3	1
ME 2221	Engineering Mechanics Lab	ME Foundation	0	3	1

Semester-4 (19 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.
MTME 2033	Complex Variables and Transforms	Natural Sciences	3	0	3
EEME 2752	Electronics Engineering	IDEE	2	0	2
EEME 2751	Electronics Engineering Lab	IDEE	0	3	1
ME 2233	Mechanics of Materials-I	ME Foundation	3	0	3
ME 2513	Fluid Mechanics-I	ME Foundation	3	0	3
ME 2033	Mechanics of Machines	ME Foundation	3	0	3
ME 2031	Mechanics of Machines Lab	ME Foundation	0	3	1
HMME 2003	English-III (Technical Report Writing)	Humanities	3	0	3

ME	2233	Mechanics of Materials-I	ME Foundation	3	0	3
ME	2513	Fluid Mechanics-I	ME Foundation	3	0	3
ME	2033	Mechanics of Machines	ME Foundation	3	0	3
ME	2031	Mechanics of Machines Lab	ME Foundation	0	3	1
HMME	2003	English-III (Technical Report Writing)	Humanities	3	0	3

Semester-5 (16 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.	
MTME	3073	Engineering Statistics	Natural Sciences	3	0	3
HMME	3xx2	Engineering Economics	Mgmt Elective	2	0	2
ME	3523	Fluid Mechanics-II	Breadth	3	0	3
ME	3521	Fluid Mechanics Lab	Breadth	0	3	1
ME	3243	Mechanics of Materials-II	Breadth	3	0	3
ME	3241	Mechanics of Materials Lab	Breadth	0	3	1
ME	3042	Machine Design and CAD-I	Breadth	2	0	2
ME	3041	Machine Design and CAD-I Lab	Breadth	0	3	1

Semester-6 (18 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.	
HMME	3033	Social Science	Humanities	3	0	3
ME	3312	Precision Engg. & Metrology	ME Foundation	2	0	2
ME	3311	Precision Engg. & Metrology Lab	ME Foundation	0	3	1
ME	3133	Heat & Mass Transfer	Breadth	3	0	3
ME	3131	Heat & Mass Transfer Lab	Breadth	0	3	1
HMME	3053	Machine Design and CAD II	Breadth	3	0	3

ME	3051	Machine Design and CAD II Lab	Breadth	0	3	1
ME	3613	Manufacturing Processes	ME Foundation	3	0	3
ME	3611	Manufacturing Processes Lab	ME Foundation	0	3	1

Semester-7 (15 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.	
EEME	4012	Control Engineering	Breadth	2	0	2
EEME	4011	Control Engineering Lab	Breadth	0	3	1
ME	4142	IC Engine	Depth	2	0	2
ME	4141	IC Engine Lab	Depth	0	3	1
ME	4153	Refrigeration & Air Conditioning	Depth	3	0	3
ME	4151	Refrigeration & Air Conditioning Lab	Depth	0	3	1
ME	4xx3	Technical Elective –I	Depth	3	0	3
ME	4912	Design Project -I	Design Project	0	6	2

Semester-8 (17 Cr. Hrs.)

Course Code	Course Title	Course Category	Lec Hrs.	Lab. Hrs.	Cr. Hrs.	
ME	4253	Mechanical Vibrations	Depth	3	0	3
ME	4251	Mechanical Vibrations Lab	Depth	0	3	1
ME	4xx3	Technical Elective Course-II	Depth	3	0	3
ME	4xx3	Technical Elective Course-III	Depth	3	0	3
HMME	4xx3	Management Elective-II	Mgmt Elective	3	0	3
ME	4924	Design Project -II	Design Project	0	12	4

MS Mechanical Engineering

1. Admission Requirements

- a) A minimum of 16 years of education leading to BS/ BE in Mechanical Engineering / Aero space/ Avionics or equivalent⁵.

- b) Minimum 2.00/4.00 CGPA or 50% marks
c) Admission Test / HEC Approved Test

2. Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

Area	Cr. Hrs.
(a) 24 Cr. Hrs course work with 6 Cr. Hrs thesis	30
(b) 27 Cr. Hrs course work with 3 Cr. Hrs project	30
(c) Course work only (10 Courses)	30

3. Core Courses

Students are required to take at least 6 Cr. Hrs. form the list of courses given below:

Course Title	Code	Cr. Hrs.
Research Methodologies for Engineers	ME 5703	3
Optimization Methods for Engineers	ME 5713	3
Experimental Methods	ME 5723	3
Finite Elements Methods	ME 5003	3
Product Design and Development	ME 5663	3
Advanced Engineering Thermodynamics	ME 5103	3

4. Specialization Requirements

A student can claim a specialization if he/she has completed 15 Cr. Hrs. including research work, if opted, from one of the specialization

areas mentioned below. Otherwise, on the completion of 30 Cr. Hrs., he/she will be awarded the MS Degree without any specialization.

⁵Applicants with undergraduate degree from non-relevant areas may be required to take some undergraduate courses to fulfill pre-requisite deficiencies as determined by the Graduate Admission Committee. The deficiency Cr. Hrs. will not be counted towards the minimum Cr. Hrs. requirement for the award of the MS degree.

Course Title	Code	Cr. Hrs.
Theory of Elasticity	ME 5013	3
Experimental Stress Analysis	ME 5023	3
Continuum Mechanics	ME 5033	3
Advanced Engineering Materials	ME 5043	3
Advanced Mechanical Vibration	ME 6003	3
Advanced Solid Mechanics	ME 6013	3
Fracture Mechanics	ME 6063	3
Advanced Mechanical Design	ME 6073	3

i. Thermal Science

Course Title	Code	Cr. Hrs.
Internal Combustion Engines	ME 5113	3
Thermal Power Generation	ME 5123	3
Gas Dynamics	ME 5133	3
Energy Conversion	ME 5143	3
Combustion	ME 5153	3
Conduction Heat Transfer	ME 5203	3
Convective Heat Transfer	ME 5213	3
Thermal Design of Heat Exchangers	ME 5223	3
Radiation Heat Transfer	ME 5233	3
Computational Heat Transfer	ME 5243	3
Advanced Fluid Mechanics	ME 5503	3
Computational Fluid Dynamics	ME 5513	3
Fluid Mixing and Separation	ME 5523	3
Transport Phenomena	ME 5533	3
Viscous Flow	ME 5543	3

ii. Manufacturing

Course Title	Code	Cr. Hrs.
Computer Integrated Manufacturing	ME 5613	3
Mechanism Design	ME 5623	3
Automation and Control	ME 5633	3
Digital Manufacture and Rapid Manufacture	ME 5643	3
Manufacturing System Design and Analysis	ME 5653	3
Production Planning and Control	ME 5673	3
Operations Research	ME 5683	3
Material Selection and Design	ME 6603	3
Robotics and Manufacturing Automation	ME 6633	3
Advanced CAD/CAM	ME 5603	3
Product Design and Development	ME 5663	3

5. Elective Courses

Course Title	Code	Cr. Hrs.
Theory of Plates and Shells	ME 6033	3
Design of Machine Tools	ME 6043	3
Tribology	ME 6053	3
Engineering Plasticity	ME 6083	3
Mechanics of Composite Materials	ME 6093	3
Solar Energy Utilization	ME 6103	3
Energy Management	ME 6113	3
Advanced Propulsion	ME 6123	3
Renewable Energy Technologies	ME 6133	3
Energy Systems	ME 6143	3

Advanced Heat and Mass Transfer	ME 6203	3
Boiling and Condensation Heat Transfer	ME 6213	3
Industrial Air Conditioning and Refrigeration	ME 6223	3
Design of Industrial Boilers and Furnaces	ME 6233	3
Fuel Cell Technology	ME 6243	3
Turbulent Flow	ME 6503	3
Boundary Layer Theory	ME 6513	3
Two Phase Flow	ME 6523	3
Kinetic Theory of Gases	ME 6533	3
Theory of Granular Flows	ME 6543	3
Aerodynamics	ME 6553	3
Modern Manufacturing Processes	ME 6613	3
Gradient Optimization Techniques	ME 6623	3
Nano Fabrication and Manufacturing	ME 6643	3
Quality Engineering and Management	ME 6653	3
Product Life Cycle Management	ME 6663	3
Productivity Engineering	ME 6673	3
Experimental Methods	ME 5723	3
Scheduling and Sequencing	ME 6683	3
Theory of Metal Cutting	ME 6693	3

6. Research Thesis/Project

Course Title	Code	Cr. Hrs.
Research Thesis	ME 6916	6
Research Project	ME 6913	3

7. CGPA Requirement

A student is required to earn a minimum 3.00/4.00 CGPA on the completion of his degree requirements.



8. Program Duration

This is normally a two years program comprising of 4 semesters. There will be a Fall and a Spring semester in each year. The maximum duration to complete MS in Mechanical Engineering is 4 years.



PhD Mechanical Engineering

The PhD program in Mechanical Engineering is designed to deliver students a broad background in mechanical engineering and related technologies. The program mission is to impart knowledge through a comprehensive and advanced curriculum followed with intense research training so that the graduating PhD's are fully prepared for industrial and technological challenges of future. The students are expected to tackle complex engineering and technological problems through a professional approach by utilizing advance tools and techniques under the guidance of professional, dedicated and research focused faculty members.

Mechanical engineering department provides students the opportunity to conduct research in Mechanical Design; Thermo-fluids and Manufacturing system.

The Department has a close liaison with the industry and R&D organizations to support and foster research activities.

Admission Requirements

- MS degree in relevant discipline*
- Minimum CGPA 3.0/4.0 (Semester System) or 60% marks (Annual System)
- Admission Test / HEC approved Test
- Interview

Degree Requirements

A PhD candidate shall be awarded degree on successful completion of the following requirements:

- a) 18 Cr. Hrs. Course Work with CGPA > 3
- b) Comprehensive Examination (written and oral)
- c) 30 Cr. Hrs. Research Work
- d) Synopsis Defense
- e) Thesis Foreign Evaluation
- f) Publication/Acceptance of at least one research paper.
- g) Local Defense

PhD scholars are required to comply with the following timeline:

Activity	Preferred Time	Maximum
Course Work	2 Semesters	3 Semesters
Comprehensive Exam	3 Semesters	5 Semesters
Synopsis Qualification	4 Semesters	6 Semesters
Thesis Submission	6 Semesters	10 Semesters

* Relevancy shall be established by the Graduate Admission Committee.

MS Engineering Management

1. Admission Requirements

- a) A minimum of 16 years of education leading to BS Degree in Engineering/ Applied Sciences or equivalent.

- b) Minimum 2.00/4.00 CGPA or 50% marks
c) Admission Test / HEC Approved Test

2. Degree Requirements

A student admitted in this program will have to complete the degree requirements by following any one of the options given below:

Area	Cr. Hrs.
a) 24 Cr. Hrs course work with 6 Cr. Hrs thesis	30
b) 27 Cr. Hrs course work with 3 Cr. Hrs project	30
c) Course work only (10 Courses)	30

3. Core Courses (12 Cr. Hrs.)

Students are required to qualify all the core courses listed below:

Course Title	Code	Cr. Hrs.
Engineering Management Techniques	EM 6113	3
Operation Management	EM 6313	3
Finance and Accounting for Engineering	EM 6213	3
Engineering Project Management	EM 6413	3

4. Elective Courses (12 Cr. Hrs)

Students are required to take 12 Cr. Hrs. from the list of elective courses given below:

Course Title	Code	Cr. Hrs.
Production Planning and Control	EM 6333	3
Supply Chain Management	EM 6343	3
Industrial Safety and Maintenance Management	EM 6373	3
Manufacturing Strategy	EM 6353	3
Product Design & Development	EM 6363	3

Project Risk Assessment and Decision Analysis	EM 6433	3
Project Management Information Systems	EM 6443	3
Project Scheduling, Planning and Control	EM 6463	3
Software Matrices	EM 6513	3
Software Quality Management	EM 6523	3
Software Requirements Engineering	EM 6533	3
Software Risk & Configuration Management	EM 6543	3
Innovation in Market Place	EM 6713	3
Quality and Productivity Improvement	EM 6133	3
Management of Project Based Organization	EM 6473	3
Project Process Planning and Control	EM 6483	3
Research Methods	EM 6143	3
Entrepreneurial Basic Plan Preparation	EM 6733	3
Competitive Strategies in Technology Management	EM 6773	3
Environmental and Energy Management	EM 6763	3
Managing Technological Innovations	EM 6723	3
Technology and Entrepreneurship	EM 6743	3
Transfer of Technology	EM 6753	3

5. Research Thesis/Project

Course Title	Code	Cr. Hrs.
Research Thesis	EM 6916	6
Research Project	EM 6913	3

6. CGPA Requirement

A student is required to earn a minimum 3.00/4.00 CGPA on the completion of his degree requirements.

7. Program Duration

This is normally a two years program comprising of 4 semesters. There will be a Fall and a

Note: The following courses are cross listed with MS Project Management.

Engineering Management	Project Management
Engineering Management Techniques	Managing People and Teams
Finance and Accounting for Engineers	Financial Management
Project Scheduling, Planning and Control	Project Process, Planning and Control
Engineering Project Management	Project Management
Project Risk Assessment and Decision Analysis	Project Risk Management



