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#### **Engr. Ihtisham Khan**

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# **MECHANICAL ENGINEERING LABORATORIES**

- Engineering Mechanics
- Engineering Materials
- Workshops
- Thermofluids
- Mechanics of Machines & Vibrations
- Instrumentation & Control

**FACULTY MEMBERS OF** 

# MECHANICAL ENGINEERING

## CURRICULUM OF B.Sc MECHANICAL ENGINEERING

#### Semester-I

Course Code	Course Title	Credit Hours
CS-109	Computer Programming	2+1
ENG-10	English-I	3+0
MATH-106	Calculus and Analytical Geometry	3+0
ME-111	Engineering Drawing and Graphics	1+1
ME-112	Introduction to Engineering	1+0
NS-101	Applied Physics	3+0
NS-111	Applied Chemistry	3+0

#### Semester-IV

Course Code	Course Title	Credit Hours
EE-201	Fundamentals of Electronics	2+1
MATH-202	Numerical Analysis	3+0
ME-214	Machine Design-I	3+0
ME-215	Mechanics of Materials-II	3+0
ME-216	Mechanics of Materials Lab	0+1
ME-223	Fluid Mechanics-I	3+0
SS-205	Engineering Economics	2+0
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#### Semester-II

Course Code	Course Title	Credit Hours
E-106	Basic Electrical Engineering	2+1
ENG-102	English-II	3+0
ИАТН-108	Linear Algebra & Differential Equations	3+0
ME-113	Workshop Practice	0+2
ME-114	Computer Aided Drawing	0+1
ME-115	Engineering Mechanics-I: Statics	3+0
ME-121	Thermodynamics-I	3+0
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#### Semester-V

Course Code	Course Title	Credit Hours
ME-311	Machine Design -II	2+0
ME-312	Instrumentation and Measurement	2+1
ME-313	Manufacturing Processes	3+1
ME-321	Fluid Mechanics-II	3+0
ME-322	Heat and Mass Transfer	3+0
ME-323	Fluid Mechanics Lab	0+1

#### Semester-III

Course Code	Course Title	Credit Hours
MATH-201	Complex Variables and Transforms	3+0
ME-211	Engineering Mechanics-II: Dynamics	3+0
ME-213	Engineering Mechanics Lab	0+1
ME-212	Mechanics of Materials-I	3+0
ME-221	Thermodynamics-II	3+0
ME-222	Thermodynamics Lab	0+1
SS-101	Islamic Studies	2+0
SS-102	Pakistan Studies	2+0
	Total Credit Hours	18

#### Semester-VI

Course Code	Course Title	Credit Hours
ENG-203	English-III	3+0
MATH-211	Probability and Statistics	3+0
ME-314	Engineering Materials	3+0
ME-315	Mechanics of Machines	3+0
ME-324	Heating, Ventilating and Air Conditioning	3+0
ME-325	Heat Transfer and HVAC Lab	0+1
ME-3XY	Technical Elective-I	2+0
	Total Credit Hours	18

#### Semester-VII

Jennester vii		
Course Code	Course Title	Credit Hours
ME-401	Health, Safety and Environment	1+0
ME-411	Mechanical Vibrations	3+0
ME-412	Mechanisms & Mechanical Vibrations Lab	0+1
ME-413	Introduction to Finite Element Analysis	2+1
ME-421	Internal Combustion Engines	3+0
ИЕ-498	Final Year Design Project-I	0+3
ME-4XY	Technical Elective-II	2+0
	Total Credit Hours	16

#### Semester-VIII

Course Code	Course Title	Credit Hours
ME-402	Project Management & Entrepreneurship	3+0
ME-414	Control Engineering	3+1
ME-422	Power Plants	3+0
ME-423	IC Engines and Power Plants Lab	0+1
ME-499	Final Year Design Project-II	0+3
ME-4XY	Technical Elective-III	2+0
	Total Credit Hours	16

#### **Total Credit Hours = 136**



Duration: Four Years

:Minimum 60% marks in Intermediate or equivalent with Physics, Chemistry and Mathematics or DAE in relevant field

The applicants with minimum 60% marks in Intermediate with Physics, Chemistry and Biology (Pre Medical) are also eligible with remedial course of Mathematics to be taught in Zero semester.

The applicants with minimum 60% marks in Intermediate with Physics, Mathematics and Computer Science are also eligible with Chemistry to be studied and passed as a remedial course in 1stsemester after admission. Appearance in entrance test conducted by ETEA or any other testing body approved by PEC.

PROGRAM EDUCATIONAL OBJECTIVE (PEOS) OF MECHANICAL ENGINEERING

- **PEO 1:** Demonstrate a blend of engineering and professional skills.
- **PEO 2:** Perform ethically and in a socially responsible manner.
- **PEO 3:** Strive to enhance learning and managerial skills.

## PROGRAM LEARNING OUTCOMES (PLOS) OF MECHANICAL ENGINEERING

- **PLO 1:** Engineering Knowledge: An ability to apply knowledge of mathematics, science and engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- **PLO 2: 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.
- **PLO 3:** 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.
- **PLO 4:** 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.
- **PLO 5:** 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.
- **PLO 6:** 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.
- **PLO 7:** 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 sustain-able development.
- **PLO 8:** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- **PLO 9:** Individual and Team Work: An ability to work effectively, as an individual or in a team, on multifaceted and/or multi disciplinary settings.
- **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.
- **PLO 11:** Project Management: 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.
- **PLO 12:** Lifelong Learning: An ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

## **CURRICULUM OF B.Sc MECHANICAL ENGINEERING TECHNOLOGY**

#### Semester-I

Course Code	Course Title	Credit Hours
MATH-106	Calculus and Analytic Geometry	3+0
CS-190	Introduction to Computer Fundamentals	1+2
MT-111	Workshop Technology	0+2
NS-100	Introduction to Physics	2+1
NS-110	Introduction to Chemistry	2+1
SS-101	Islamic Studies	2+0
	Total Credit Hours	17

#### Semester-IV

Jennester IV		
Course Code	Course Title	Credit Hours
ENG-202	Technical Report Writing	3+0
MATH-211	Probability and Statistics	3+0
MGT-335	Total Quality Management	2+0
MT-214	Machine Design	3+0
MT-215	Engineering Statics	2+1
MT-222	Fluid Mechanics	2+2
	Total Credit Hours	18

#### Semester-II

Course Code	Course Title	Credit Hours
MATH-108	Linear Algebra and Differential Equations	3+0
MT-102	Basic Electrical and Electronics	2+2
MT-101	Technical Drawing and CAD-1	2+2
MT-121	Applied Thermodynamics-I	2+2
SS-102	Pakistan Studies	2+0
	Total Credit Hours	17

#### Semester-V

Course Code	Course Title	Credit Hours
MGT-333	Project Management	3+0
MT-311	Dynamics	2+1
MT-312	Manufacturing Processes	2+1
MT-321	Heat Transfer	2+1
MT-322	IC Engines	2+2
SS-205	Engineering Economics	2+0
	Total Credit Hours	18

#### Semester-III

Course Code	Course Title	Credit Hours
ENG-103	Communication Skills	3+0
MT-211	CAD-II	0+3
MT-212	Industrial Materials	2+1
MT-213	Mechanics of Materials	2+1
MT-221	Applied Thermodynamics - II	2+1
	Total Credit Hours	15

#### Semester-VI

Course Code	Course Title	Credit Hours
MT-302	Material Handling and Safety	3+1
MT-313	Instrumentation and Control	2+1
MT-314	Mechanical Vibration	2+1
MT-323	Refrigeration and Air Conditioning	2+1
MT-498	Project-I	0+3
	Total Credit Hours	16

#### Semester-VII

Course Code	Course Title	Credit Hours
∕IT-400	Supervised Industrial/Field Training	0+16
MT-499	Project-II	
	Total Credit Hours	16

#### Semester-VIII

ourse Code	Course Title	Credit Hours
Г-400	Supervised Industrial/Field Training	0+16
	Total Credit Hours	16

#### **Total Credit Hours = 136**



Duration: Four Years

gibility: Minimum 50% marks in intermediate or equivalent with Physics, Chemistry and Mathematics or DAE in relevant field.

The applicants with minimum 60% marks in Intermediate with Physics, Chemistry and Biology (Pre Medical) are also eligible with remedial course of Mathematics to be taught in 1st semester. Passing aptitude test of CECOS.

# PROGRAM EDUCATIONAL OBJECTIVE (PEOS) OF MECHANICAL ENGINEERING TEC

- **PEO 1:** Graduates will demonstrate knowledge of Mechanical Engineering Technology appropriate for career pursuits and workplace needs.
- Graduates will have the ability to understand, diagnose, communicate & provide solutions to technical problems/situations for the benefit of the society
- **PEO 3:** Graduates will demonstrate the intellectual curiosity to actively pursue the acquisition of new knowledge & skills necessary to refine and improve his/her abilities to contribute to the Technology domain
- **PEO 4:** Graduates will show Ethical commitment that allows them to deal successfully with social, technical and professional situations in their lives and work.

# PROGRAM LEARNING OUTCOMES (PLOS) OF MECHANICAL ENGINEERING TECH

- **PLO 1:** Engineering Technology: An ability to apply knowledge of mathematics, natural science, technology fundamentals and technology specialization to defined and applied technology procedures, processes, systems or methodologies.
- **PLO 2: Problem Analysis:** An ability to Identify, formulate, research literature and analyze broadly-defined technology problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialization.
- **PLO 3:** Design/Development of Solutions: An ability to design solutions for broadly- defined technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
- **PLO 4:** 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.
- **PLO 5:** Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, and modern technology and IT tools, including prediction and modelling, to broadly-defined technology problems, with an understanding of the limitations.
- **PLO 6:** The Engineer and Society: An ability to demonstrate an understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to technology practice and solutions to broadly defined technology problems.
- **PLO 7:** Environment and Sustainability: An ability to understand and evaluate the sustainability and impact of technology work in the solution of broadly defined technology problems in societal and environmental contexts.
- **PLO 8:** Ethics: Understand and commit to professional ethics and responsibilities and norms of technology practice.
- PLO 9: Individual and Team Work: An ability to function effectively as an individual and as a member or leader in diverse teams.
- **PLO 10:** Communication: An ability to communicate effectively on broadly defined technology activities with the technologist community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **Project Management:** An ability to demonstrate knowledge and understanding of technology management principles and apply these to one's own work, as a member or leader in a team and to manage projects in multidisciplinary environments.
- **PLO 12:** Lifelong Learning: An ability to recognize the need for, and have the ability to engage in independent and lifelong learning in specialist technologies.

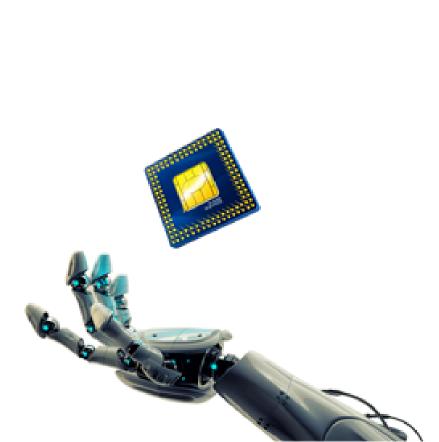
# BS ROBOTICS AND ARTIFICIAL INTELLIGENCE

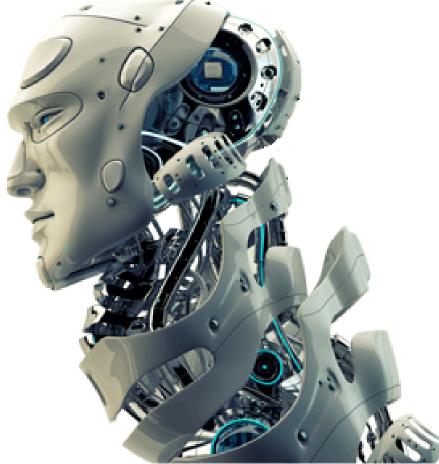
Step into the future with our BS Robotics & Artificial Intelligence Program, where innovation meets intelligence!

Shape the world of tomorrow by mastering the technologies that are redefining industries today. Our cutting-edge curriculum combines robotics, artificial intelligence, machine learning, and automation to produce next-generation graduates who are ready to lead the digital revolution.

With hands-on labs, industry-connected faculty, and real-world projects, you'll not only learn Artificial Intelligence and Robotics, you'll live it. Turn your curiosity into capability & your ideas into intelligent machines.

Ready to build the future? Your journey begins here at CECOS University.





## CURICULUM OF BS ROBOTICS AND ARTIFICIAL INTELLIGENCE

#### Semester-I

Course Code	Course Title	Credit Hours
ENG-101	Functional English	3+0
RAI-101	Statics	3+0
RAI-111	Linear circuit analysis	2+0
CS-110	Application of Information & Communication Technologies	2+1
RAI-131	Introduction to Robotics	2+0
SS-101	Islamic Studies	2+0
	General Mathematics (for pre med)	Non Credit
	Understanding of Holy Quran - I	0+1
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#### Semester-IV

Course Code	Course Title	Credit Hour
ME-313	Manufacturing processes	2+1
RAI-212	Signals & Systems	2+1
RAI-223	Data structures and Algorithms	3+0
MATH-211	Probability and statistics	3+0
SS-204	Civics and Community Engagement	2+0
SS-205	Engineering Economics	2+0
	Total Credit Hours	16

#### Semester-II

Course Code	Course Title	Credit Hours
ENG-102	Expository Writing	3+0
MATH-106	Calculus & Analytical Geometry	3+0
RAI-102	Computer Aided Design	0+1
RAI-112	Electronics	3+0
RAI-113	Electrical and electronics lab	0+1
RAI-122	Programming Fundamentals I	2+1
SS-102	Understanding of Holy Quraan - II	0+1
	Pakistan Studies	2+0
	Total Credit Hours	17

#### Semester-V

Course Code	Course Title	Credit Hours	
RAI-321	Robot Programming	2+1	
ME-315	Mechanics of Machines	3+0	
RAI-301	Mechanical Design of Robots I	2+0	
RAI-311	Electrical Drives	3+0	
RAI-312	Sensors and Actuators	3+0	
CS-218	Artificial Intelligence	3+0	
	Total Credit Hours	17	

#### Semester-III

urse Code	Course Title	Credit Hours
ATH-108	Linear Algebra & Differential Equation	3+0
l-201	Dynamics	3+0
l-202	Mechanics of Materials	3+1
-221	Digital Logic Design	3+1
l-222	Programming Fundamentals II	2+1
	Tatal Condit Harris	17

#### Semester-VI

urse Code	Course Title	Credit Hours
AI-302	Mechanical Design of Robots II	2+0
1E-414	Control Engineering	3+1
AI-313	Embedded Systems	2+1
I-231	Machine Learning	3+0
AI-3XX	Technical Elective-I	3+0
S-203	Ideology & Constitution of Pakistan	2+0
	Total Credit Hours	17

#### Semester-VII

Semester VII		
Course Code	Course Title	Credit Ho
ME-413	Intro to Finite Element Methods	2+1
RAI-421	Introduction to Deep Learning	3+0
RAI-431	Robot Modeling & Control	3+1
RAI-498	Final Year Design Project I	0+3
RAI-4XX	Technical Elective-II	3+0
RAI-422	Artificial Intelligence Lab	0+1
	Total Credit Hours	17

#### Semester-VIII

Course Code	Course Title	Credit Hours
MGT-333	Project Management	2+0
MGT-431	Entrepreneurship	2+0
RAI-401	Industrial Automation	2+1
RAI-423	Introduction to Computer Vision	2+1
RAI-499	Final Year Design Project II	0+3
RAI-4XX	Technical Elective-III	3+0
	Total Credit Hours	16

**Total Credit Hours = 133** 



imum 50% marks in intermediate or equivalent with mathematics / minimum 50% marks in intermediate (without mathematics) with two deficiency courses of mathematics to be studied and passed in 1st

Passing aptitude test of CECOS.

#### MS MECHANICAL ENGINEERING/MS ENGINEERING MANAGEMENT

The degree program is of a 2 year duration and spans four 16-18 week semesters. Total credit hours for the MS program are 30 (i.e., 24 credit hours of coursework plus 6 credit hours of thesis and research in case of MS by research Plan-A).

In Year-II, selected students will embark on a thesis project (i.e. on basis of their CGPA, as well as synopsis defence); others will have to opt for the non-thesis track (i.e. all 30 credit hours derived from coursework Plan-B). Students with unsatisfactory performance in their thesis research will be shifted to the non-thesis track.

#### SCHEME OF STUDIES

MS Students must accumulate the requaired 30 credit hours as per the following distribution:

#### Plan-A (MS Mechanical Engineering)

Category	Credit Hou
Core Subjects	15
Elective Subjects	09
Thesis	06
Total Credit Hours	30

#### Plan-B (MS Mechanical Engineering)

Category	Credit Hours
Core Subjects	15
Elective Subjects	09
Additional Subjects	06
Total Credit Hours	30

### Plan-A (MS Engineering Management)



#### Plan-B (MS Engineering Management)

Category	Credit Hours
Core Subjects	18
Elective Subjects	06
Additional Subjects	06
Total Credit Hours	30

#### MS ENGINEERING MANAGEMENT

Curriculum for MS Engineering Management Program

#### **CORE COURSES**

Course Code	Subject	Credit Hours
EM-601	Principles Of Engineering Management	3
EM-602	Advanced Engineering System Optimization And Simulation	3
EM-603	Engineering Management Methods, Data, Information And Modeling	3
EM-604	Engineering Entrepreneurship	3
EM-605	Engineering Project Management	3
EM-606	Economic Analysis of Engineering System	3
EM-607	Methods for Quality Improvement in Engineering Concern	3
EM-608	Statistical Methods for Engineering Data Analysis	3
EM-609	Technology Management	3
EM-616	Accounting and Financial Analysis for Engineers	3

#### **FACT FILE ELIGIBILITY**

- Minimum 16-year education in relevant field with minimum 2.0 CGPA or 60% marks from University / DAI recognized by HEC and accredited by relevant Accreditation body (PEC)
- Qualifying GAT-General Test of CECOS University or any other approved testing body (NTS/ETEA)

#### **Elective Courses**

Course Code	Subject	Credit Hours
EM-610	Risk Analysis And Management	3
EM-611	Production And Operation Management	3
EM-613	Emerging Trends In Services, Management, Engineering And Design	3
EM-614	Construction Planning And Operations	3
EM-615	Creativity, Innovation And Leadership	3

#### **MANAGEMENT ELECTIVE COURSES\***

Course Code	Subject	Credit Hours
ME-580	Industrial Management	3
ME-581	Total Quality Management	3
ME-582	Organizational Behavior for Engineers	3
ME-583	Management in Technical Organization	3
ME-584	Human Resource Management	3

• Any management elective course can be taken if approved by HOD & Coordinator

#### MS MECHANICAL ENGINEERING

Curriculum for MS Mechanical Engineering Program

#### **Core Courses**

Course Code	Subject	Credit Hours
ME-500	Advanced Numerical Analysis	3
ME-501	Finite Element Analysis	3
ME-502	Experimental Stress Analysis	3
ME-503	Advanced Stress Analysis	3
ME-504	Product Design & Development	3
ME-505	Advanced CAD/CAM	3
ME-506	Computer Integrated Manufacturing	3
ME-507	Advanced Manufacturing System	3
ME-508	Advanced Metal Forming	3
ME-509	Theory of Metal Cutting	3
ME-510	Advanced Mechanical Vibration	3
ME-511	Advanced Design of Mechanism	3
ME-521	Advanced Engineering Materials	3
ME-522	Characterization of Materials	3
ME-523	Materials Thermodynamics	3
ME-524	Composite Materials	3
ME-525	Heat Treatment of Metals & Alloys	3
ME-526	Polymer Science & Engineering	3
ME-527	Biomaterials	3
ME-528	Evaluation Techniques and Instruments	3
ME-529	Phase Equilibrium & Microstructures	3
ME-530	Application and Selection of Materials	3
ME-531	Mechanical Behavior of Materials	3
ME-532	Design of Experiments	3

#### **Elective Courses**

Course Code	Subject	Credit Hours
ME-540	Engineering Design Optimization	3
ME-541	Advanced Thermodynamics	3
ME-542	Advanced Fluid Mechanics	3
ME-543	Computational Fluid Dynamics	3
ME-544	Continuum Mechanics	3
ME-545	Advanced Dynamics	3

#### **Elective Courses**

ourse Code	Subject	Credit Hours
ME-546	Advanced Solid Mechanics	3
ME-547	Industrial Air Conditioning and Refrigeration	3
ME-548	Internal Combustion Engines	3
ME-549	Design of Machine Tools	3
ME-550	Artificial Intelligence in Design and Manufacturing	3
ME-551	Joining of Advanced Materials	3
ME-552	Automation and Control	3
ME-553	Tribology	3
ME-554	Solar Energy Utilization	3
ME-555	Fracture Mechanics	3
ME-556	Manufacturing Design and Cost Analysis	3
ME-557	Production Management & Control	3
ME-558	Advanced Mechanical Design	3
ME-559	Engineering Plasticity	3
ME-560	Fatigue of Metals and Structures	3
ME-561	Deformation and Failure of Materials	3
ME-562	Mechanics of Composite Materials	3
ME-563	Behaviour of Materials under Impact Loading	3
ME-564	Computer Application in Mechanical Engineering	3
ME-565	Mechanics of Micro Structure	3
ME-566	Optimization of Engineering Systems	3
ME-567	Non Metallic and Composite Materials	3
ME-568	Theory of Elasticity	3
ME-569	Modeling & Simulation	3
ME-570	Robotics	3
ME-571	Modeling of Dynamic System	3
ME-572	Advanced Control System	3
ME-573	Manufacturing Planning & Control	3
ME-574	Fuel Cell and Hydrogen Technology	3
ME-600	Advanced Topics in Design and Manufacturing	3
ME-601	Advanced Topics in Engineering Materials	3

#### FACT FILE ELIGIBILITY

- Minimum 16-year education in relevant field with minimum 2.0 CGPA or 60% marks from University / DAI
  recognized by HEC and accredited by relevant Accreditation body (PEC)
- Qualifying GAT-General Test of CECOS University or any other approved testing body (NTS/ETEA)