MINISTRY OF EDUCATION & TRAINING
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION

UNDERGRADUATE PROGRAM

Major of

MACHINE MANUFACTURING TECHNOLOGY

October 2023

UNDERGRADUATE PROGRAM

Program's Name: MACHINE MANUFACTURING TECHNOLOGY

Level: Undergraduate

Major: **MACHINE MANUFACTURING TECHNOLOGY**   **Major's ID: 52510202**

Type of Program: Full Time

(Issued by decision No. ……dated….of Rector of………)

Apply from 2020 courses onward

1. Duration of study: 4 years

2. Student Enrollment: High-school graduates

3. Grading system, Curriculum and Graduation Requirements

Grading system: 10

Curriculum: Based on regulations issued by decision No. 17/VBHN-BGDĐT

Graduation requirements:

- *General conditions***:** Based on regulations issued by decision No. 17/VBHN-BGDĐT
- *Major conditions***:** Fulfil the internship
- *Requirements of High-Quality Training education*: Circular No. *23/2014/TT-BGDĐT dated on 18-07-2014*

4. The objectives and Expected Learning Outcomes

Goals

Training human resources, improving intellectual standards of the people, fostering talents; researching science and technology for new knowledge & product creation to meet the requirements of development of economics& society, to ensure national defense, security and international integration.

Training learners have political quality, morality, knowledge, professional practice skills, research capacity, development of scientific applications and technologies that are commensurate with the level of training. They have a healthy body, creative capability and professional responsibility, adaptability to the work environment; spirit of serving the people.

Training **Machine Manufacturing Technology** major have basic scientific knowledge, fundamental knowledge, specialized knowledge of electrical and electronics major, analysis capability, solve problem skills and solutions assessment, ability contribution, design, operation of mechanical systems, communication skills and work in a team, professional attitudes, meet the development requirements of major and society. After graduation, the graduates are able to work in companies, factories, industrial manufactories.

Objectives

PO1: Form a stable foundation of general knowledge, foundation and core knowledge and specialized/ major knowledge of **Machine Manufacturing Technology**.

PO2: Use proficiently self-studying skills major, problem solving skills and professional skills in the major of **Machine Manufacturing Technology**.

PO3: Communicate effectively, organize, lead and conduct teamwork.

PO4: Apply well competences of brainstorming, designing, deploying, and operating the systems of **Machine Manufacturing** System.

PO5: Be able to grasp society's needs, carry out social responsibilities, respect work ethics and be aware of life-long learning

Program outcomes

Symbol	Expected Learning Outcomes	Competence level
1.	**KNOWLEDGE AND TECHNICAL ARGUMENTS**	
1.1	Apply fundamental knowledge of mathematics, natural science and social science; achieve more specialized knowledge and study further at higher levels	**3**
1.2	Construct the basis of core technological knowledge about machine manufacturing technology	**4**
1.3	Application of expertise in designing, calculating, testing and diagnosing automotive systems or managing business, automotive services	**4**
2.	**PERSONAL SKILLS AND PROFESSIONAL SKILLS**	
2.1	Analysis, explanation and argument to machine manufacturing technology problems	**5**
2.2	Experiment and explore knowledge of machine manufacturing technology issues	**5**
2.3	The ability to think and Systemic thinking in machine manufacturing technology issues	**4**
2.4	Having professional and managerial skills to improve operational efficiency in the machine manufacturing technology major	**3**
2.5	Having professional ethics, a sense of environmental protection and professional working manner.	**3**
3.	**COMMUNICATION AND TEAMWORKING SKILLS**	
3.1	Creative skills and entrepreneurship	**4**
3.2	Ability to work in groups and lifelong learning	**4**
3.3	Communication skills and use specialized English	**4**
4.	**ESTABLISHING IDEAS, DESIGN, IMPLEMENTATION, AND OPERATION IN THE CONTEXT OF ENTERPRISES, SOCIAL AND ENVIRONMENT - CREATIVE PROCESS**	
4.1	Conceiving ideas, setting requirements in real production, defining functions, modeling and managing manufacturing projects in the mechanical field	**5**
4.2	Able to formulate ideas about machine manufacturing technology	**5**
4.3	Fabricating, assembling and controlling the quality of mechanical system	**5**

4.4	Capable of calculating, designing, simulating and operating the components of machine manufacturing technology	4
4.5	Able to lead, work in groups and solve related technical issues in the machine manufacturing technology	3
4.6	Knowledge entrepreneurship, business in the machine manufacturing technology major	3

Capacity scale

Competence level		Short description
$0.0 \leq$ Level ≤ 1.0	Basic	Remember: Students memorize / recognize / recall knowledge by actions such as definition, repetition, listing, identification, identification, ...
$1.0 <$ Level ≤ 2.0	Satisfaction	Understand: Students create their own knowledge from documents, knowledge by actions such as explanation, classification, illustration, reasoning, ...
$2.0 <$ Level ≤ 3.0		Application: Students implement / apply knowledge to create products such as models, real objects, simulation products, reports, ...
$3.0 <$ Level ≤ 4.0	Proficiency	Analysis: Students analyze materials / knowledge into details / parts and indicate their relationships as a whole by actions such as analysis, classification, comparison, synthesis, ...
$4.0 <$ Level ≤ 5.0		Assessment: Students make judgments, predictions about knowledge / information according to standards, criteria and measurement indicators which have been determined by actions such as comments, criticisms, recommendations, ...
$5.0 <$ Level ≤ 6.0	Excellent	Creation: Students create / organize / organize / design / generalize parts / parts in other / new ways to create new structures / models / products.

5. Studying condition:
- Well-equipped classrooms with modern Teaching and Learning facilities to match international standards.
- The students are taken privileged to use the most modern labs of the University.
- Class size is small and most suitable for a best teaching/learning environment.
- The faculty are among the most experienced Professors, Ass. Professors, Senior lecturers from UTE or the Universities around the area.

What makes this program differs from the other programs:

- Honor training programs that are taken from the advanced higher education of G7 countries.
- More than 75% of faculty are PhDs, Senior lecturers who have graduated from spoken English

countries.
- The curriculum is project-based.
- English competency of graduates is qualified at B2 or EILTS ≥ 6.0 equivalent.
- Strong soft skills established.
- Strong ability to research and innovate.
- The Teaching Assistance (TA) policy proves to efficiently support the weak students.
- The family-connected policy to inform the academic status of the students proved to foster the students' studying progress.

6. Total program credits: 150 credits (without Physical Education, Military Education, and Supplementary Courses)

7. Allocation of credits

Tên	Số tín chỉ		
	Tổng	**Bắt buộc**	**Tự chọn**
Foundation science courses	**59**	**57**	**2**
General Politics + Laws	13	13	0
Social Sciences and Humanities	2	0	2
English	17	17	0
Mathematics and Natural Sciences	19	19	0
Seminar On Industrial Demands	2	2	0
Technical Computer Sciences	3	3	0
Introduction to Engineering Technology	3	3	0
Mechanical Engineering Courses	**91**	**75**	**16**
Fundamental Mechanical Engineering courses	33	26	7
Advanced Mechanical Engineering courses	34	25	9
Experiments and Practices	13	14	0
Internship	4	4	0
Graduation thesis	7	7	0
Total	**150**	**132**	**18**

8. Contents of The Program

A. Compulsory Courses

8.1 Foundation science courses (59 credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	LLCT130105E	Philosophy of Marxism and Leninism	3	1	
2	LLCT120205E	Political economics of Marxism and Leninism	2	2	
3	LLCT120405E	Scientific socialism	2	3	
4	LLCT120314E	Ho Chi Minh's ideology	2	3	
5	LLCT220514E	History of Vietnamese communist party	2	1	

6	GELA220405E	General Law	2	1	
7	ACEN340535E	Academic English 1	4	1	
8	ACEN340635E	Academic English 2	4	1	
9	ACEN440735E	Academic English 3	4	2	
10	ACEN440835E	Academic English 4	4	2	
11	ENTW611038E	English for Thesis Writing	1	5	
12	IEPR550935E	IELTS Preparation	5	4	Non-accumulation
13	INME130125E	Introduction to Mechanical Engineering	3	1	
14	COPR134529E	Computer Programming 1	3	2	
15	MATH132401E	Calculus 1	3	3	
16	MATH132501E	Calculus 2	3	4	
17	MATH132601E	Calculus 3	3	1	
18	MATH132901E	Mathematical Statistics for Engineers	**3**	**2**	
19	PHYS130902E	Physics 1	3	2	
20	PHYS111202E	Physics - Laboratory 1	1	1 - 6	
21	GCHE130603E	General Chemistry for Engineers	3	1	
22	SEMI323525E	Seminar on Industrial Demands	2	2	
23	PHED110513E	Physical Education 1	0	3	
24	PHED110613E	Physical Education 2	0	2	
25	PHED130715E	Physical Education 3	0	2	
26	GDQP008031E	Military Education	0		
27		Option Course - General Knowledge	2		
Total *(excluding Physical Education and Military courses)*			**59**		

8.2 Mechanical Engineering Courses (91 Credits)

8.2.1 Fundamental Mechanical Engineering courses

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	MEDR141123E	Mechanical Engineering Drawing (3+1)	4	2	
2	ENME130620E	Engineering Mechanics	3	3	
3	MEMA230720E	Mechanics of Materials	3	4	
4	MMCD230323E	Mechanisms and Machine Components Design	3	5	
5	MDPR310423E	Machine Design Project	1	6	
6	TOMT220225E	Tolerances and Measuring Techniques	2	3	
7	EXMM210325E	Experiments in Mechanical Measurement	1	4	

8	ENMA220230E	Engineering Materials	2	2	
9	MATE210330E	Materials Testing	1	3	
10	FMMT330825E	Fundamentals of Machine Manufacturing Technology	3	4	
11	EEEI421925E	Electrics and Electronics in Industrial Machines	2	4	
12	ELDR312025E	Experiments in Electrics and Electronics in Industrial Machines	1	5	
13		Option Course - Foundation Knowledge	7	3 - 5	
		Total	**33**		

8.2.2.a Advanced Mechanical Engineering courses *(Theory and Experiment Courses)*

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	METE224230E	Metal Technology	2	4	
2	MTNC330925E	Machines and Numerical Control Systems	3	4	
3	MMAT444225E	Machine Manufacturing Technology	4	5	
4	PMMT411625E	Projects on Machine Manufacturing Technology	1	6	
5	PNHY330529E	Pneumatic & Hydraulic Technology	3	5	
6	EPHT310629E	Experiments in Pneumatic & Hydraulic Technology	1	6	
7	CAED321024E	Computer assisted design - CAE	2	5	
8	CCCT431725E	CAD/CAM-CNC Technology	3	5	
9	AUMP323525E	Automation of Manufacturing Process	2	5	
10	EMPA310829E	Experiments in Automation of Manufacturing Process	1	6	
11	MODM331225E	Mold Design and Manufacturing	3	6	
12	LEBU323525E	Leadership and business in engineering (CNCTM) (2TC)	0	1 - 6	
13		Option Course - Expertise Knowledge	09	5 - 7	
		Total	**34**		

8.2.2.b Advanced Mechanical Engineering courses *(Practice and Internship Courses)*

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1 s	MHAP110127E	Mechanical Works Practice	1	1	

2	WEPR210430E	Welding Practice	1	2	
3	MEPR240227E	Mechanical Practice 1	4	3	
4	MEPR330327E	Mechanical Practice 2	3	3	
5	PCNC322125E	Practice of CNC	2	6	
6	PCCC321825E	Practice on CAD/CAM-CNC Technology	2	5	
7	FAIN443025E	Industry Internship	4	8	
		Total	**17**		

8.2.3 Graduation thesis (7 Credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	GRAT473125E	Graduation Thesis (Machine Manufacturing Technology)	**7**	7 or 8	

B.   Elective courses
(*)Foundation science courses (2 Credits)

Number	Course's ID	Course Name	Credits	Semester	Lecturers
1	GEEC220105E	General Economics	2		
2	INMA220305E	Introduction to Management	2		
3	INLO220405E	Introduction to Logics	2		
4	ULTE121105E	Learning Methods in University	2		
5	SYTH220505E	Systematic Thinking	2		
6	PLSK320605E	Planning Skill	2		
7	IVNC320905E	Introduction to Vietnamese Culture	2		
8	SCDR130324E	Sketch Drawing	3		
9	INSO321005E	Introduction to Sociology	2		

Notes: Student selects **1** course with 2 credits

(*) Fundamental Mechanical Engineering Courses (7 Credits)

Number	Course's ID	Course Name	Credits	Semester	Lecturers
1	MEVI220820E	Mechanical Vibrations	2		
2	CFDY433624E	Computer Fluid Dynamic - CFD	3		
3	HEAT220332E	Heat Transfer	2	4, 5, 6	
4	AIAP324024E	AI application for mechanical design	2		
5	OPTE322925E	Optimal Engineering	2		
6	WSIE320425E	Safety and Industry Environment	2		
7	AUCO330329E	Automatic Control	3		

Notes: Student selects **2 - 3** courses with **7** credits

(*) Advanced Mechanical Engineering Courses (09 Credits)

Number	Course's ID	Course Name	Credits	Semester	Lecturers
1	IMAS330625E	Maintenance in Industry	3		
2	AEMM214025E	Experiment of Advanced Mechanical Measuring	1		
3	MMMM323725E	Modern Mechanical Measurement Methods	2		
4	NATE322625E	Nano Technology	2	5, 6, 7	
5	INRO321129E	Industrial Robots	2		
6	MAMS333625E	Modeling and Analysis of Dynamic Systems	3		
7	IFEM230220E	Introduction to Finite Element Method (2+1)	3		
8	INDE434025E	Inverse design (2+1)	3		

Notes: Student selects **3 - 4** courses with 09 credits

C. Supplementary courses (17 credits)

No.	Course's ID	Course Name	Credits	Notes
1	ACEN340535E	Academic English 1	4	
2	ACEN340635E	Academic English 2	4	
3	ACEN440735E	Academic English 3	4	
4	ACEN440835E	Academic English 4	4	
5	ENTW611038E	English for Thesis Writing	1	
6	IEPR550935E	IELTS Preparation	5	Non-accumulation

8. Plan of Courses

1st Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	PHED110513E	Physical Education 1	0 (1)	
2	PHYS130902E	Physic 1	3	
3	LLCT130105E	Philosophy of Marxism and Leninism	3	
4	ACEN340535E	Academic English 1	4	
5	ACEN340635E	Academic English 2	4	
6	INME130125E	Introduction to Mechanical Engineering (2+1)	3	
7	MATH132401E	Calculus 1	3	
8	GELA220405E	General Law	2	
		Total	**22**	

2nd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	PHED110613E	Physical Education 2	0	
2	MHAP110127E	Mechanical Works Practice	1	
3	LLCT120405E	Scientific Socialism	2	
4	LLCT120205E	Political Economics of Marxism and Leninism	2	
5	ENMA220230E	Engineering Materials	2	
6	MEDR141123E	Mechanical Engineering Drawing (3+1)	4	
7	PHYS111202E	Physics - Laboratory 1	1	
8	MATH132501E	Calculus 2	3	
9	ENME130620E	Engineering Mechanics	3	
10	ACEN440735E	Academic English 3	4	
11	ACEN440835E	Academic English 4	4	
		Total	**26**	

3rd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	PHED130715E	Physical Education 3	0	
2	MATE210330E	Materials Testing	1	
3	WEPR210430E	Welding Practice	1	
4	COPR134529E	Computer Programming 1	3	

5	LLCT220514E	History of Vietnamese communist party	2	
6		**Elective** - General Knowledge	2	
7	MATH132601E	Calculus 3	3	
8	MATH132901E	Mathematical Statistics for Engineers	3	
9	MEMA230720E	Mechanics of Materials	3	
10	LLCT120314E	Ho Chi Minh's Ideology	2	
		Total	**20**	

4th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	IEPR550935E	IELTS Preparation	5	Non-accumulation
2	GCHE130603E	General Chemistry for Engineers	3	
3	MMCD230323E	Mechanisms and Machine Components Design	3	
4	METE224230E	Metal Technology	2	
5	FMMT330825E	Fundamentals of Machine Manufacturing Technology	3	
6	MEPR240227E	Mechanical Practice 1	4	
7	TOMT220225E	Tolerances and Measuring Techniques	2	
8	EXMM210325E	Experiments in Mechanical Measurement	1	
		Total	**18**	

5th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	MDPR310423E	Machine Design Project	1	
2	MTNC330925E	Machines and Numerical Control Systems	3	
3	EEEI421925E	Electrics and Electronics in Industrial Machines	2	
4	MMAT444225E	Machine Manufacturing Technology	4	
5	MEPR330327E	Mechanical Practice 2	3	
6	PCCC321825E	Practice on CAD/CAM-CNC Technology	2	
7	CCCT431725E	CAD/CAM-CNC Technology	3	
8	CAED321024E	Computer assisted design - CAE	2	
9		**Elective** - Foundation Knowledge	3	
10	ENTW611038E	English for Thesis Writing	1	
		Total	**24**	

6th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	PNHY330529E	Pneumatic & Hydraulic Technology	3	
2	ELDR312025E	Experiments in Electrics and Electronics in Industrial Machines	1	
3	EPHT310629E	Experiments in Pneumatic & Hydraulic Technology	1	
4	PMMT411625E	Projects on Machine Manufacturing Technology	1	
5	AUMP323525E	Automation of Manufacturing Process	2	
6	SEMI323525E	Seminar on Industrial Demands	2	
7	MODM331225E	Mold Design and Manufacturing	3	
8	PCNC322125E	Practice of CNC	2	
9		**Elective** Course - Foundation Knowledge	4	
10		**Elective** Course - Expertise Knowledge	5	
		Total	**24**	

7th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	LEBU323525E	Leadership and business in engineering (CNCTM)	0	
2	EMPA310829E	Experiments in Automation of Manufacturing Process	1	
3	FAIN443025E	Industry Internship Thực tập Tốt nghiệp	4	
4		**Elective** - Expertise Knowledge	4	
		Total	**9**	

8th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	GRAT473125E	Graduation Thesis	7	
		Total	**7**	

ELECTIVE COURSES

Foundation science courses (Student selects 1 course - 2 credits)

No.	Course ID	Course Title	Credits	Note
1	GEEC220105E	General Economics	2	Student selects **1** course with 2 credits
2	INMA220305E	Introduction to Management	2	
3	INLO220405E	Introduction to Logics	2	

4	ULTE121105E	Learning Methods in University	2	
5	SYTH220505E	Systematic Thinking	2	
6	PLSK320605E	Planning Skill	2	
7	IVNC320905E	Introduction to Vietnamese Culture	2	
8	INSO321005E	Introduction to Sociology	2	
9	SCDR130324E	Sketch Drawing	3	

Fundamental Mechanical Engineering Courses (Student selects 2 - 3 courses - 7 Credits)

No.	Course ID	Course Title	Credits	Semester	Note
1	MEVI220820E	Mechanical Vibrations	2		Student selects **2 - 3** courses with **7** credits
2	CFDY433624E	Computer Fluid Dynamic – CFD	3		
3	HEAT220332E	Heat Transfer	2		
4	AIAP324024E	AI Application for Mechanical Design	2	5, 6	
5	OPTE322925E	Optimal Engineering	2		
6	AUCO330329E	Automatic Control	3		

Advanced Mechanical Engineering Courses (Student selects 3 - 4 courses - 9 credits)

No.	Course ID	Course Title	Credits	Semester	Note
1	IMAS330625E	Maintenance in Industry	3		Student selects **3 - 4** courses with 9 credits
2	MOLD431224E	Mold Design and Fabrication	3		
3	PMDM321324E	Practice of Mold Design and Manufacturing	2		
4	NATE322625E	Nanotechnology	2		
5	INRO321129E	Industrial Robots	2	6,7	
6	IFEM230220E	Introduction to Finite Element Method (2+1)	3		
7	INDE434025E	Inverse Design (2+1)	3		

9. COURSE DESCRIPTION AND WORKLOAD

FOUNDATION SCIENCE COURSES

1. Calculus I   Credits: 3

Distribution of learning time: 3 (3/0/6)
Prerequisites: None
Former subjects of condition: None

Course Description: This course helps students review the general and advanced mathematical knowledge: Cardinality of a set: rational numbers, real numbers, complex numbers. Limit: function, limit of a function, continuous function. Differential calculus: derivative, differential, Taylor-Maclaurin expansion, the survey on function, curve in polar coordinates. Calculus of single variable: volume fraction uncertainty, definite integrals, generalized integrals. Chain: Chain number, string functions, power series, Taylor-Maclaurin sequence, Fourier series, Fourier expansion, trigonometric series.
Textbook:
1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

2. Calculus II   Credit: 3

Distribution of learning time: 3 (3/0/6)
Prerequisites: None
Former subjects of condition: **Calculus I**

Course Description: This course provides the learner with contents: Matrix-determinant: the matrix, the form of matrix, inverse matrix, determinants, matrix classes. System of Linear Equations: linear systems, Cramer rule, Gauss method, homogeneous system. Space Vector: Space Vector, subspace, linear independence, linear dependence, basis, dimension, Euclidean space. Diagonal matrix-quadratic form: eigenvalues, eigenvectors, private space, diagonal matrix, quadratic form, canonical form, the surface level 2. Differential calculus of function of several variables: function of several variables, derivative, differential, extreme of function of several variables, calculus applications in geometry in space.
Textbook:
1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

3. Calculus III   Credit: 3

- *Distribution of learning time: 3 (3/0/6)*
- *Prerequisites: None*
- *Former subjects of condition:* **Calculus II**
- *Course Description*: This course provides the learner with contents: multiple integral: double integral, application for calculated area of flat domain, calculate the surface area, object volume, triple integrals, and applications for the object volume. Line integral: line integral type one and applications, line integral type one and applications, Green formula, condition of line integral does not depend on integrating line. Surface integral: Integral surface type one, type two, the Ostrogratski formula, vector field, flux and divergence, vector format of Ostrogratski formula, Stokes formula, circulation and vortex vector, vector format of Stokes formula.
- *Textbook:*
    1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

4. Principles of Physics 1   Credit: 3

- *Distribution of learning time: 3(2/1/4)*

- *Prerequisites: None*
- *Former subjects of condition: None*
- *Summaries of course:* This course provides the learner with contents: the mechanics: point dynamics, the law of conservation, solid motion. Thermodynamics: kinetic molecular theory, principles of Thermodynamics I, principles of Thermodynamics II. Electricity and magnetism: electric field, magnetic, variability of electrical magnetic field.
- *Text book*: R.A. Serway và J.W. Jewett. Physics for Scientists and Engineers with Modern Physics, 8th Edition

5. General Chemistry for Engineers (GCHE130603) (3 credits)

- *Distribution of learning time: 3(2/1/4)*
- *Prerequisites: None*
- *Former subjects of condition: None*
- *Summaries of course:* This course provides general chemistry necessary for engineering and science. This course covers fundamentals of electronic structures of atoms, relationship of electron and atomic properties, geometric configuration of the molecule, the polarity of the molecules, link of the physical molecules, a preliminary study on the physical and chemical properties of inorganic substances and their structures.
- *Text book:* Lawrence S. Brown, Chemistry for Engineering Students, Brooks/Cole, Cengage Learning, 2nd edition, 2011, 608 papers

6. Introduction to Engineering Technology   Credits: 03 (2+1)

- *Course workload: 3 (2, 1, 6)*
- *Prerequisite:*
- *Course description:* The goal of this course is to provide first-year students a broad outline of engineering, the skills needed to explore different disciplines of engineering and help them decide on a career in engineering.
- *Textbook:*
  [1] Engineering Fundamentals: An Introduction to Engineering, Saaed Moaveni, 3rd edition, CL engineering (2007)
  [2] An introduction to mechanical engineering, Wickert J. and Lewis K., 3rd edition, CL engineering (2012)

FUNDAMENTAL MECHANICAL ENGINEERING COURSES

1. Introduction to Engineering Technology   Credits: 3

Prerequisite: None
Course Description:
The goal of this course is to provide first-year students with a broad outline of engineering, the skills needed to explore different disciplines of engineering, and help them decide on a career in engineering.
Textbook:
1) Moaveni, Saaed. *Engineering Fundamentals: An Introduction to Engineering*. 3rd ed., CL Engineering, 2007.
2) Wickert J., and Lewis K. *An Introduction to Mechanical Engineering*. 3rd ed., CL Engineering, 2012.

2. Descriptive Geometry and Engineering Drawing   Credits: 3

Prerequisite:None
Course Description:
This course provides students with the fundamental theory of engineering drawing, including the engineering drawing standards, the basic drawing skills and principles, the methods of representation and orthographic projection. It also cultivates the abilities of writing and reading the engineering drawing.

Textbooks:
1) Madsen, David A., and David P. Madsen. *Engineering Drawing and Design*. 6th ed., Cengage Learning, 2016.
2) Narayana, K. L., P. Kannaiah, and K. Venkata Reddy. *Machine Drawing*. 3rd ed., New Age International Publishers, 2008.

3. Theoretical Mechanics   Credits: 3

Prerequisite:Physics 1

Course Description:
This course provides fundamental knowledge of mechanical engineering. In this course, the following topics will be covered: *statics* (statics axioms, force, connection, reaction, system analysis); *kinematics* (study the motion of points, objects, translation and rotation, kinematic analysis); and *dynamics* (physical laws, theorems of dynamics, D'Alambert principles, Lagrange equations).
Textbook:
1) Hibbeler, Russell C. *Engineering Mechanics*. 13th ed., Prentice Hall, 2012.
2) Meriam, J. L., and L. G. Kraige. *Engineering Mechanics*. 7th ed., John Wiley & Sons Inc., 2006.

4. Strength of Materials   Credits: 4

Prerequisite: Theoretical Mechanics
Course Description:
This course introduces students to fundamental knowledge of strength of materials, methods of calculating the stress, strain in mechanical components, structural members under loading, load capacity, and deformations.
Textbook:
1) Beer, Ferdinand P., and E. Russell Johnston. *Mechanics of Materials*. McGraw-Hill, 1992
2) Hibbeler, Russell C. *Mechanics of Materials*. 9th ed., Prentice Hall, 2013.

5. Theory of Machine and Machine Design   Credits: 3

Prerequisite: Strength of Materials
Course Description:
This course provides students with knowledge relating to structures, working principles and calculating methods of kinematics, dynamic designs of machines and mechanisms, and standard mechanical joints and components. By the end of the course, students will be able to independently solve calculating problems and machine design problems.
Textbooks:
1) Michels, W. J., C. E. Wilson, and A. D. Deutschman. *Machine Design: Theory and Practice.* Macmillan, 1975.
2) Mott, Robert L. *Machine Elements in Mechanical Design*. 5th ed., Pearson, 2013.

6.Project on Theory of Machine and Machine Design   Credits: 1

Prerequisite: Theory of Machine and Machine Design
Course Description:
In this course, students will apply the knowledge gained in the course "Theory of Machine and Machine Design" for the purposes of designing a machine or a module of a machine. The application of this knowledge includes kinematics, dynamic designs of machines and mechanisms, standard mechanical joints and components. By the end of the course, students will be able to independently solve calculating problems and machine design problems   .
Textbooks:
1) Michels, W. J., C. E. Wilson, and A. D. Deutschman. *Machine Design: Theory and Practice.* Macmillan, 1975.
2) Mott, Robert L. *Machine Elements in Mechanical Design*. 5th ed., Pearson, 2013.

7. Measuring Techniques and Tolerances   Credits: 3

Prerequisite: None
Course Description:
This course provides the learner with fundamental knowledge about tolerance and assembly of common joints in machine manufacturing industry, such as smooth cylindrical joints, key joints, flower joints, threaded joints, methods of solving size sequence problems, and basic principles for recording dimensions on detailed drawings, some types of measuring instruments, and methods of measuring the basic parameters of the parts.
Textbooks:
1) Henzold, Georg. *Geometrical Dimensioning and Tolerancing for Design, Manufacturing and Inspection: A Handbook for Geometrical Product Specification Using ISO and ASME Standards*. 2nd ed., Butterworth-Heinemann, 2006.
2) Narayana, K. L., P. Kannaiah, and K. Venkata Reddy. *Machine Drawing*. 3rd ed., New Age International Publishers, 2008.

8. Materials Science   Credits: 3

Prerequisite: None
Course Description:
 This course introduces the learner with the properties of metal and metallic alloy, metallic materials in manufacturing, heat treating to manipulate mechanical properties of metallic materials, fundamentals of structure, and properties of polymer, composite materials, rubber, etc.
Textbook:
1) Callister, William D. Jr., and David G. Rethwisch. *Materials Science and Engineering: An Introduction*. 8th ed., John Wiley & Sons Inc., 2010.

9. Computer-Aided Design (CAD)   Credits: 3

Prerequisite: None
Course Description:
This course equips students with foundations of CAD in mechanical engineering, develops the ability to create and read technical drawings, and outlines the first step for students to use computer technology for design.
Textbook:
1) Onwubolu, Godfrey C. *Computer-Aided Engineering Design with SolidWorks*. Imperial College Press, 2013.
2) Planchard, David. *Engineering Graphics with SOLIDWORKS 2015*. SDC Publications, 2014.
3) Shih, H. *Autodesk Inventor 2015 and Engineering Graphics*. SDC Publications, 2014.

10. Thermal Engineering   Credits: 2

Prerequisite: None
Course Description:
This course provides students with some basic concepts of technical thermodynamics, the Laws of 1 and 2, the cycles of labor and consumption, and how to calculate the heat and labor for the cycles. The heat transfer section helps students grasp some related concepts as well as the laws of heat exchange: heat conduction, convection heat transfer, heat radiation. It also introduces students to common thermal instruments such as dryer/dehydrator, steam boiler, or heat exchanger.
Textbook:
1) Moran, Michael J., et al. *Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics, and Heat Transfer*. 2nd ed., Wiley, 2002.

11. Electrical and Electronic Engineering   Credits: 2

Prerequisite: None

Course Description:
This course equips students with knowledge of electrical circuits, circuit design, 1-phase, and 3-phase AC circuits. The students will also be introduced to working principles and calculation methods of current regulator, synchronous motor, asynchronous motor, DC motor, as well as working principles and calculation methods of basic electrical and electronic components such as a diode, transistor BJT, MOSFET, SCR, TRIAC, Opamp.
Textbook:
1) Herman, Stephen. *Industrial Motor Control*. Delmar Cengage Learning, 2014.
2) Theraja, B. L. and A. K. Theraja. *A Textbook of Electrical Technology, Vol 1: Basic Electrical Engineering*. S Chand & Co, 1999.
3) Theraja, B. L. and A. K. Theraja. *A Textbook of Electrical Technology,Vol 4: Electronic Devices and Circuits*. 23rd ed., S Chand & Co, 2006.

12. Practice of Electrical and Electronic Engineering   Credits: 1

Prerequisite: Electrical and Electronic Engineering
Course Description:
This course equips students with knowledge of electrical devices and electronic components while enhancing the ability to use and select electrical devices, install a residential and industrial electrical system, assemble a circuit, and measure basic electrical parameters.
Textbook:
1) Herman, Stephen. *Industrial Motor Control*. Cengage Learning, 2014.

13. Fluid Mechanics   Credits: 2

Prerequisite: None
Course Description:
This course provides fundamental knowledge of fluid statics, kinematics and dynamics, and analysis of ideal fluid motion and its practical applications. It includes the following contents: properties of fluid, equilibrium law of static fluid, calculating hydrostatic pressure, the laws of fluid flow and its characteristic parameters without regard to the force, the force acting in the environment fluid flow, laws of force interaction between fluid flow and solid objects, unidirectional fluid motion that flows through a nozzle hole. The course also provides learners with knowledge and skills in calculating, designing, analyzing, evaluating, and consulting the advantages and disadvantages of hydraulic systems for constructions.
Textbook:
1) Munson, Bruce R., et al. *Fundamentals of Fluid Mechanics*. 7th ed., Wiley, 2012.

14. Engineering Vibration   Credits: 2

Prerequisite: None
Course Description:
This course introduces students to dynamics and vibration of mechanical systems, its calculating methods, and analysis.
Textbook:
1) Inman, Daniel J. *Engineering Vibration*. 4th ed., India, Prentice Hall, 2013.

15. Fundamentals of Machinery Manufacturing Technology   Credits: 3

Prerequisite: None
Course Description:
This course provides the theoretical basis of metal cutting and machining methods, processing accuracy and surface quality of workpieces, influencing factors and remedial directions, selecting the standard and set when processing, features cutting and machining processes on universal, specialized machines, etc.
Textbooks:
1) El-Hofy, Hassan Abdel-Gawad. *Fundamentals of Machining Processes: Conventional and Nonconventional*. CRC Press, 2013.

2) Juneja, B. L. *Fundamentals of Metal Cutting and Machine Tools*. New Age International, 2003.

3) Knight, Winston A. *Fundamentals of Metal Machining and Machine Tools*. 3rd ed., Taylor and Francis, 2016.

16. Machinery Manufacturing Technology   Credits: 3

Prerequisite: None
Course Description:
This course provides students with knowledge of technology process procedures and making fixtures for manufacturing machine parts. It introduces typical manufacturing processes, as well as assembly technology.
Textbooks:
1) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.

2) Rao, P. N. *Manufacturing Technology*: *Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

17. Machine Manufacturing Technology Project   Credits: 1

Prerequisite: None
Course Description:
In this course, the students will apply the knowledge obtained in the Machinery Manufacturing Technology course, making a manufacturing process with a specific machine part.
Textbooks:
1) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.

2) Rao, P. N. *Manufacturing Technology*: *Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

1. Manufacturing Process Automation   Credits: 2

Prerequisite: Electrical and Electronic Engineering
Course Description:
This course provides knowledge of the structure of an automatic control system, and shows students how to use sensors, actuators, and PLC in building an automated manufacturing process. This course also introduces students to PLC programming and application of PLC in manufacturing process automation.
Textbook:
1) Kalpakjian, Serope, and Steven Schmid. *Manufacturing Engineering and Technology*. 7th ed., Pearson, 2013.

2. Mold Design and Fabrication   Credits: 3

Prerequisite: None
Course Description:
This course introduces students to mold and its applications, and provides knowledge of molding design and fabrication procedures such as injection molding, hot die, cold die, etc.
Textbook:
1) Menges, G., W. Michaeli, and P. Mohren. *How to Make Injection Molds*. 3rd ed., Hanser Gardner Publications, 2001.

3. Production and Quality Management   Credits: 2

Prerequisite: None
Course Description:
This course provides students with knowledge needed to be able to organize the production effectively and engage in product quality management in the enterprise.
Textbook:

1) Myers-McDevitt, Paula J. *Apparel Production Management and the Technical Package*. Fairchild Books, 2010.

4. Maintenance in Industry   **Credits: 3**

Prerequisite: None
Course Description:
This course provides the learner with an understanding of the following activities: organization and management of industrial maintenance, scheduling maintenance for a specific industrial equipment, planning removable machine parts, adjusting the system of industrial equipment, maintenance of equipment clusters, and maintenance of industrial machinery and equipment, in order to provide students with knowledge and skills needed to carry out maintenance activities in accordance with procedures and safety
Textbook:
1) Tomlingson, Paul. *Maintenance in Transition*. Independent Publisher Services, 2014.

5. Nanotechnology   **Credits: 2**

Prerequisite: None
Course Description:
This course provides students with fundamental knowledge of making materials and functional structures at nanoscale, and presents the contemporary and future applications of nanotechnology. Students are equipped with basic knowledge regarding the structure of nanomaterial, as well as their processing procedure. This course provides an understanding of the physical, biochemical and other characteristics of nanostructures when they are examined on a different scale.
Textbook:
1) Natelson , Douglas. *Nanostructures and Nanotechnology*. Cambridge University Press, 2015.

6. Industrial Product Design   **Credits: 3**

Prerequisite: None
Course Description:
This course aims to provide students with basic knowledge of:
Methods of product development from ideating, sketching, designing, shaping and decorating metal products; creating new models to meet consumers' needs by offering a harmonious combination of cultural and aesthetic values;
The designs used as models for industrial products with the goal of developing high-quality products to meet customer needs with the lowest cost;
Testing of industrial product design to provide students with knowledge and skills to be able to design a specific industrial product according to the methods provided.
Textbook:
1) Ulrich, Karl T., and Steven D. Eppinger. *Product Design and Development*. 4th ed., McGraw-Hill, 2007.

7. Energy and Energy Management   **Credits: 2**

Prerequisite: None
Course Description:
This module aims to provide students with basic concepts of energy and other forms of energy in human history, the transformation of the form of energy, and the close relationship between environmental issues and energy. Learners are equipped with basic knowledge about clean, renewable energy and the basic principles of the methods of creation of new energy sources such as solar, biomass, fuel cells, etc. The students are also equipped with knowledge of energy conservation and management that complies with contemporary state-of-the-art processes.
Textbook:
1) Doty, Steve, and Wayne C. Turner. *Energy Management Handbook*. 8th ed., Fairmont Press, 2012.

8. CAD/CAM-CNC   Credits: 3

Prerequisite: None
Course Description:
This course provides the learner with the fundamentals of CAD/CAM solution and basic skills including selection of machining processes order, cutting tool selection, CNC programming, and approaching methods for the utilization of CAD/CAM software.
Textbooks:
1) EMCO WinNC GE Series Fanuc 21 TB.
2) EMCO WinNC GE Series Fanuc 21 MB.
3) EMCO Win Tutorials - Modular Instructor Guide for Industry and Training - PC Turn/Mill 55 GE Fanuc Series 21.

9. Numerical Control Systems   Credits: 4

Prerequisite:
Course Description:
This course aims to provide students with basic knowledge of:
- General cutting machines such as lathe, drilling, milling, shaping, planning, grinding machines, and their properties according to: basic working principle: types of geometrical shapes of a workpiece, methods of forming surface, tool and work motion; Basic and special configuration; Structural and kinetic schemes, general equations; Adjusting and control.
- Concepts and knowledge about NC and CNC machines according to numerical control, computer numerical control, interpolation, motion systems, and special devices.

Textbook:
1) Seames, Warren. *Computer Numerical Control: Concepts & Programming*. 4th ed., Cengage Learning, 2001.

10. Pneumatic-Hydraulic Technology   Credits: 3

Prerequisite: None
Course Description:
This course provides the learner with an understanding of operating principles of a pneumatic control system, electro-pneumatics, hydraulics, electro-hydraulics, advantages and disadvantages of a pneumatic/hydraulic control system compared to electrical control system, the components, basic design principles of the pneumatic/hydraulic control system, fault detection, and maintenance for pneumatic/hydraulic system.
Textbook:
1) Jagadeesha, T. *Hydraulics and Pneumatics*. I K International Publishing House, 2015.

11. Industrial Robots   Credits: 2

Prerequisite: None
Course Description:
This course provides knowledge of robots and their applications in automated manufacturing, services, and daily life. Based on this knowledge, students can quickly approach and efficiently exploit the advantages of robots in different areas.
Textbook:
1) Niku, Saeed B. *Introduction to Robotics: Analysis, Systems, Applications*. 3rd ed., Wiley, 2011.

12. Numerical Methods in Mechanical Engineering   Credits: 2

Prerequisite: None
Course Description:

This course provides knowledge of numerical methods in designing and analysing mechatronic systems. This course will cover the following topics: basic theorems, equations, applications of numerical methods in structural mechanics, heat transfer, kinematics, and fluid mechanics. Advanced approaches will be used to build mathematical models to represent and solve technical problems.

Textbook:
1) Hamming, R. W. *Numerical Methods for Scientists and Engineers*. 2nd ed., Dover Publications, 1987.

13. Optimal Engineering   Credits: 2

Prerequisite: None
Course Description:
This course equips students with knowledge of optimal engineering, including the skills to model and solve engineering optimization problems, methods to solve linear optimization, non-linear optimization, single-objective optimization, multi-objective optimization, etc.

Textbook:
1) Hiriart-Urruty, Jean-Baptiste, et al., editors. *Advances in Mathematical Modeling, Optimization and Optimal Control.* Springer International Publishing, 2016.

14. Metalworking Practice   Credits: 2

Prerequisite: None
Course Description:
This course provides basic knowledge and skills in metalworking with hand tools and basic equipment such as punchers, chisels, files, drills, and measuring equipment.
Textbooks:
1) El-Hofy, Hassan Abdel-Gawad. *Fundamentals of Machining Processes: Conventional and Nonconventional*. CRC Press, 2013.
2) Juneja, B. L. *Fundamentals of Metal Cutting and Machine Tools*. New Age International, 2003.
3) Knight, Winston A. *Fundamentals of Metal Machining and Machine Tools*. 3rd ed., CRC Mechanical Engineering, Taylor and Francis, 2016.
4) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.
5) Rao, P. N. *Manufacturing Technology: Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

15. Arc Welding Practice   Credits: 1

Prerequisite: None
Course Description:
This course introduces students to concepts and operating principles of arc welding, welding sticks, and operating principles of TIG and MIG systems.
Textbook:
1) Jeffus, Larry. *Welding: Principles and Applications*. 7th ed., *Cengage Learning*, 2011.

16. Turning Practice   Credits: 3

Prerequisite:
Course Description:
 This course provides basic knowledge and skills in turning and grinding.
Textbooks:
1) El-Hofy, Hassan Abdel-Gawad. *Fundamentals of Machining Processes: Conventional and Nonconventional*. CRC Press, 2013.
2) Juneja, B. L. *Fundamentals of Metal Cutting and Machine Tools*. New Age International, 2003.
3) Knight, Winston A. *Fundamentals of Metal Machining and Machine Tools*. 3rd ed., CRC Mechanical Engineering, Taylor and Francis, 2016.

4) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.
5) Rao, P. N. *Manufacturing Technology: Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

17. Milling Practice   Credits: 2

Prerequisite:
Course Description:
This course provides basic knowledge and skills in milling.
Textbooks:
1) El-Hofy, Hassan Abdel-Gawad. *Fundamentals of Machining Processes: Conventional and Nonconventional*. CRC Press, 2013.
2) Juneja, B. L. *Fundamentals of Metal Cutting and Machine Tools*. New Age International, 2003.
3) Knight, Winston A. *Fundamentals of Metal Machining and Machine Tools*. 3rd ed., CRC Mechanical Engineering, Taylor and Francis, 2016.
4) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.
5) Rao, P. N. *Manufacturing Technology: Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

18. Practice of Manufacturing Process Automation   Credits: 1

Prerequisite: None
Course Description:
This course helps students reinforce their knowledge of manufacturing process automation, and the use of sensors, motors, pneumatic/hydraulic valves in the control system. It also enables the students to apply working principles of elements of automatic control, install and program PLC, and connect PLC with peripheral devices.
Textbooks:
1) El-Hofy, Hassan Abdel-Gawad. *Fundamentals of Machining Processes: Conventional and Nonconventional*. CRC Press, 2013.
2) Juneja, B. L. *Fundamentals of Metal Cutting and Machine Tools*. New Age International, 2003.
3) Knight, Winston A. *Fundamentals of Metal Machining and Machine Tools*. 3rd ed., CRC Mechanical Engineering, Taylor and Francis, 2016.
4) Krar, Steve. *Machine Tool and Manufacturing Technology*. Willey, 1997.
5) Rao, P. N. *Manufacturing Technology: Metal Cutting and Machine Tools*. Tata McGraw-Hill Education, 2000.

19. Internship   Credits: 4

Prerequisite:
Course Description:
This course helps students to strengthen and improve knowledge gained during their time at university. The aim is to apply specialized knowledge to solve real problems while practicing the skills of an engineer, building styles and working methods of electronic engineers in professional activities. Furthermore, the goal is to train the students' ability in the domain of analysis, synthesis, proposals and problem-solving using soft skills.

20. Graduation Thesis   Credits: 7

The dissertation consists mainly of an industrial or research-based project carried out under the supervision of one or more faculty members. It introduces students to the basic methodology of research in the context of a problem of current research interest.

10. Campus Infrastructure

Follow the Ministry of education and training's regulations

10.1 Workshops and Laboratories:
- Mechanical Measurement Technology Laboratory
- Industrial Electrical Equipment Laboratory
- Equipment Maintenance Laboratory
- Metalworking Workshop
- Gas Welding Workshop
- Electroslag Welding Workshop
- CAD/CAM-CNC Laboratory
- Computer cluster
- Simulation and Automation Laboratory
- PLC Laboratory
- Pneumatic - Hydraulic Laboratory
- Automated Manufacturing Laboratory
- Robotics Laboratory

10.2 Library, Website
- University's Library
- Faculty's Library
- Faculty's Website

11. PROGRAM GUIDE

- Credit hour is calculated as:

1 credit	= 15 lecture hours
	= 30 laboratory hours
	= 45 hours practice
	= 45 hours self -study
	= 90 workshop hours.
	= 45 hours for project, thesis.

- Graduation thesis: conduct a research project to solve specific problems related to the major.

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DEAN OF FACULTY

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