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

UNDERGRADUATE PROGRAM

Major of

MECHANICALENGINEERING TECHNOLOGY

09/2022

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

SOCIALIST REPUBLIC OF VIETNAM
Independence – Liberty - Happiness

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UNDERGRADUATE PROGRAM

EducationProgram:MECHANICAL ENGINEERING TECHNOLOGY

Level: Undergraduate

Major:**MECHANICAL ENGINEERINGTECHNOLOGY**

Type of Program:Full time

(Decision No……date….on……)

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 of Decision No 43/2007/BGDDT

Graduation Requirements:

*General condition***:** Based on regulations of Decision No 43/2007/BGDDT

*Condition of specialty***:** None

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 havepolitical 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.

MechanicalEngineering Technology major is aimed to train mechanical engineers with solid background on fundamental sciences and professional knowledge related to manufacturing engineering; good skills at critical thinking, problem solving and evaluation; good ability of planning of production processes, participating in organizing, operation and management duties; proficient communication and teamwork skills; appropriate professional attitudes adapted to the development requirements of the major and society.

After graduation, graduates can work in the mechanical engineering factories and companies. They can also work in the fields of engineering services or R&D departments under the role of direct operators, facilitators or managers.

Objectives

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

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

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

PO4: Conceive, design, implement and operate successfully mechanical engineering systems.

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

Program outcomes

A. General knowledge, fundamental and specialized knowledge of Mechanical Engineering:

ELO 1. Apply fundamental knowledge of mathematics, natural science and social science; achieve more specialized knowledge and study further at higher levels.

ELO 2. Construct the basis of core technological knowledge about Mechanical Engineering.

ELO 3. Create the combination of advanced specialized knowledge in the fields of Mechanical Engineering.

B. Specialized and professional skills in Mechanical Engineering:

ELO 4. Analyze and argue for technical matters; brainstorm systematically, and solve mechanical matters.

ELO 5. Examine and experiment mechanical matters.

ELO 6. Implement proficiently professional skills in the Mechanical Engineering field.

C. Communication skills and ability to work in multidiscipline areas:

ELO 7. Work independently; lead and work in a team.

ELO 8. Communicate effectively in various methods: written communication, mechanical drawing communication, graphics and presentation.

ELO 9. Use English in communication.

ELO 10. Realize the roles and responsibility of engineers and social circumstance which has impacts on the technical activities of industry.

ELO 11. Comprehend business culture, work ethics principles, and working style of industrial organizations.

ELO 12. Be aware of life-long learning.

D. Skills to take shape of ideas, design, deploying and operate mechanical engineering systems

ELO 13. Conceive, plan and manage the projects in accordance to the industrial requirements.

ELO 14. Design and stimulate technological equipment and processes.

ELO 15. Operate and maintain CNC systems.

5. Blocks of knowledge in the whole program: 150 credits (without Physical Education, Military Education, and Supplementary Courses)

6. Allocation of credits

Groups of Courses	No. of Credits		
	Total	**Compulsory**	**Optional**
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
Technical Computer Sciences	3	3	0
Seminar on Industrial Demands	2	2	0
Introduction to Engineering Technology	3	3	0
Mechanical Engineering Courses	**91**	**68**	**23**
Fundamental Mechanical Engineering courses	43	32	11
Advanced Mechanical Engineering courses	23	11	12
Experiments and Practices	14	14	0
Internship	4	4	0
Graduation thesis	7	7	0
Total	**150**	**125**	**25**

7. CONTENTS OF THE PROGRAM

A. COMPULSORY COURSES

7.1 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	2	
4	LLCT120314E	Ho Chi Minh's ideology	2	2	
5	LLCT220514E	History of Vietnamese communist party	2	3	
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	3	
15	MATH132401E	Calculus 1	3	1	

16	MATH132501E	Calculus 2	3	2	
17	MATH132601E	Calculus 3	3	3	
18	MATH130901E	Mathematical Statistics for Engineers	3	4	
19	PHYS130902E	Physics 1	3	1	
20	PHYS111202E	Physics - Laboratory 1	1	1-6	
21	GCHE130603E	General Chemistry for Engineers	3	3	
22	SEMI323524E	Seminar on Industrial Demands	2	1-6	
23	PHED110513E	Physical Education 1	0	1	
24	PHED110613E	Physical Education 2	0	2	
25	PHED130715E	Physical Education 3	0	3	
26	GDQP008031E	Military Education	0		
27		Optional Course - General Knowledge	2		
Total *(excluding Physical Education and Military courses)*			**59**		

7.2 Mechanical Engineering Courses (91 Credits)

7.2.1 Fundamental Mechanical Engineering courses

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	MEDR141123E	Mechanical Engineering Drawing	4	2	
2	ENME130620E	Engineering Mechanics	3	2	
3	MEMA230720E	Mechanics of Materials	3	3	
4	MMCD230323E	Mechanisms and Machine Components Design	3	4	
5	MDPR310423E	Machine Design Project	1	5	
6	TOMT220225E	Tolerances and Measuring Techniques	2	4	
7	EXMM210325E	Experiments in Mechanical Measurement	1	5	
8	ENMA220230E	Engineering Materials	2	3	
9	MATE210330E	Materials Testing	1	5	
10	FMMT330825E	Fundamentals of Machine Manufacturing Technology	3	4	
11	PNHY330529E	Pneumatic & Hydraulic Technology	3	4	
12	EPHT310629E	Experiments in Pneumatic & Hydraulic Technology	1	5	
13	CACC320224E	CAD/CAM-CNC	2	5	
14	ECCC310324E	Experiments on CAD/CAM-CNC	1	5	
15	CAED321024E	Computer assisted design - CAE	2	5	
16	LEBU323524E	Leadership and business in engineering (CNKTCK) (2TC)	0	1-6	

17		Option Course - Foundation Knowledge	11	4, 5	
		Total	**43**		

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

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	ACCC330524E	Advanced CAD/CAM-CNC	3	6	
2	MOLD431224E	Mold Design and Manufacturing	3	6	
3	MMAT431525E	Machine Manufacturing Technology	4	5	
4	PMMT411625E	Projects on Machine Manufacturing Technology	1	6	
5		Optional Course - Expertise Knowledge	12	6,7	
		Total	**23**		

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

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	MHAP110127E	Mechanical Works Practice	1	2	
2	WEPR210430E	Welding Practice	1	3	
3	MEPR240227E	Mechanical Practice 1	4	4	
4	PCNC322124E	CNC Practice	2	6	
5	PLAP322224E	Practice on Plastic Technology	2	6	
6	PACC320624E	Practice on Advanced CAD/CAM-CNC	2	7	
7	PMDM321324E	Practice in Mold Design and Manufacturing	2	7	
8	FAIN442324E	Industry Internship	4	7	
		Total	**18**		

7.2.3 Graduation thesis (7 Credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	GRAT472424E	Graduation Thesis	**7**	8	

B. OPTIONAL COURSES

(*) Foundation science courses (2 Credits)

No	Course's ID	Course Name	Credits	Semester	Note

1	GEEC220105E	General Economics	2	4	Student chooses 1 course
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 (11 Credits)

No	Course's ID	Course Name	Credits	Semester	Note
1	HEAT220332E	Heating Transfer	2	4,5	Student chooses 4-6 courses for 11 credits
2	CFDY433624E	Computer Fluid Dynamic - CFD	3		
3	METE330226E	Metal Technology	3		
4	EEEI421925E	Electrics and Electronics in Industrial Machines	2		
5	ELDR312025E	Experiments in Electrics and Electronics in Industrial Machines	1		
6	MEVI220820E	Mechanical Vibrations	1		
7	OPTE322925E	Optimal Engineering	2		

(*) Advanced Mechanical Engineering Courses (12 Credits)

No	Course's ID	Course Name	Credits	Semester	Note
1	SHET321524E	Sheet Metal Forming Process	2	5, 6	Student chooses 4-6 courses for 12 credits
2	IMAS330625E	Maintenance in Industry (2+1)	3		
3	NUMC330424E	Numerical Control System	3		
4	MPAU320729E	Automation of Manufacturing Process	2		
5	EMPA310829E	Experiments in Automation of Manufacturing Process	1		
6	NATE322625E	Nano technology	2		
7	INDE434025E	Inverse design (2+1)	3		
8	IFEM230220E	Introduction to Finite Element Method (2+1)	3		

8. Plan of Courses

1st Semester

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

2nd Semester

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

3rd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	LLCT220514E	History of Vietnamese communist party	2	
2	PHED130715E	Physical Education 3	0	
3	LLCT120314E	Ho Chi Minh’s ideology	2	
5	WEPR210430E	Welding Practice	1	
6	ENMA220230E	Engineering Materials	2	

7	MATH132601E	Calculus 3	3	
8	GCHE130603E	General Chemistry for Engineers	3	
9	COPR134529E	Computer Programming 1	3	
10	MEMA230720E	Mechanics of Materials	3	
		Optional Course - Foundation Knowledge (1)	2	
Total			**21**	

4th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Option Course - Foundation Knowledge (2)	3	
2	IEPR550935E	IELTS Preparation	5	Non-accumulation
3	MATH132901E	Mathematical Statistics for Engineers	3	
4	TOMT220225E	Tolerances and Measuring Techniques	2	
5	MMCD230323E	Mechanisms and Machine Components Design	3	
6	FMMT330825E	Fundamentals of Machine Manufacturing Technology	3	
7	MEPR240227E	Mechanical Practice 1	4	
8	PNHY330529E	Pneumatic & Hydraulic Technology	3	
Total			**21**	

5th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Optional Course - Foundation Knowledge (3)	6	
2	MDPR310423E	Machine Design Project	1	
3	EXMM210325E	Experiments in Mechanical Measurement	1	
4	MATE210330E	Materials Testing	1	
5	EPHT310629E	Experiments in Pneumatic & Hydraulic Technology	1	
6	CACC320224E	CAD/CAM-CNC	2	
7	ECCC310324E	Experiments on CAD/CAM-CNC	1	
8	CAED321024E	Computer assisted design - CAE	2	
9	MMAT444225E	Machine Manufacturing Technology	4	
Total			**19**	

6th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	SEMI323524E	Seminar on Industrial Demands	2	
2	PCNC322124E	CNC Practice	2	
3	PLAP322224E	Practice on Plastic Technology	2	
4	ACCC330524E	Advanced CAD/CAM-CNC	3	
5	MOLD431224E	Mold Design and Manufacturing	3	
6	PMMT411625	Projects on Machine Manufacturing Technology	1	
7		Optional Course - Expertise Knowledge (1)	9	
8	ENTW611038E	English for Thesis Writing	1	
Total			**23**	

7th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Optional Course - Expert Knowledge (2)	3	
2	PMDM321324E	Practice in Mold Design and Manufacturing	2	
3	PACC320624E	Practice on Advanced CAD/CAM-CNC	2	
4	LEBU323524E	Leadership and business in engineering (CNKTCK)	0(2)	
5	FAIN442324E	Industry Internship	4	
Total			**11**	

8th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	GRAT472424E	Graduation Thesis	7	
Total			**7**	

E. Massive Open Online Courses

Aimed to leverage the students' competency to quickly adapt themselves to higher education of advanced countries, the following courses may be taken in place of aforementioned courses.

#	Course ID	Course name	Credits	Equivalent MOOC	Equivalent percentage
1.	DIPR330685	Digital Image Processing	3	Fundamentals of Digital Image and Video Processing https://www.coursera.org/learn/digital	100
2.	MALE431984	Machine Learning	3	https://www.coursera.org/learn/machine-learning	50
3.	BDES233877	Big Data Essentials	3	https://www.coursera.org/learn/big-data-essentials	100
4.	INSE330380	Information Security	3	https://classroom.udacity.com/courses/ud459	100

9. COURSE DESCRIPTION AND WORKLOAD

MATHS, PHYSICS AND CHEMISTRY COURSES

1. Calculus 1

Credits: 3 (3/0/6)

Course description:

This course provides the basic principles of limits, continuity, differential calculus and integral calculus of single variable algebraic and transcendental functions and applications of the derivative, differentials, indefinite integrals, definite integrals.

2. Calculus 2

Credits: 3 (3/0/6)
Prerequisite courses: Calculus 1
Course description:

Calculus 2 provides the basic knowledge of the integration of functions of a variable, of infinite series, of power series, and of vectors in the plane and in space.

3. Calculus 3

Credits: 3 (3/0/6)
Prerequisite courses: Calculus 1, Calculus 2
Course description:

The course equips students with the basic knowledge about functions of several variables, partial derivatives, double and triple integrals, line and surface integrals, and vector calculus. The students also learn how to apply this knowledge to solve problems in physical science and other life sciences.

4. Mathematical Economics 1

Credits: 3 (3/0/6)

Course description:

Mathematical Economics 1 course provides the basic knowledge of matrix, determinant, linear equation system, vector space $\mathbb{R}^n$, quadratic form, differentiation of functions of one variable and many variables. This course also provides some applications in economics.

5. Mathematical Economics 2

Credits: 3 (3/0/6)

Prerequisite courses: Mathematical Economics1

Course description:

The course includes knowledge of Total Differentials, Integration and Random Variables, Linear Difference Equations, Differential Equations and some applications in economics.

6. Mathematical Statistics for Engineers

Credits: 3 (3/0/6)
Prerequisite courses: Calculus 2 or Mathematical Economics1
Course description:

This course is designed to cover topics from mathematical statistics that are of interest to students from engineering and/or the sciences. Topics should include descriptive statistics, elementary probability, random variables and distributions, mean variance, parameter estimation, hypothesis testing and time permitting- correlation, regression and analysis of variance.

7. Linear algebra and Algebraic structures

Credits: 4 (4/0/8)

Course description:

The purpose of the course is to develop a basic understanding of linear algebra, some basic algebraic structures and their relationship with cryptology. In this course, the students will learn how to work with vector spaces, manipulate matrices, solve systems of linear equations, encode and decode messages. In particular, the students should learn to recognize vector spaces, and compute their bases, express a linear transformation as a matrix, perform basic matrix manipulations, compute the determinant of a matrix, use the Gram-Schmidt process, compute eigenvalues and eigenvectors and diagonalize (orthogonally) a (symmetric) matrix, classify quadratic forms, use some algebraic crypto-systems to encode and decode messages,…

8. Linear algebra

Credits: 3 (3/0/6)

Course description:

The purpose of the course is to develop a basic understanding of linear algebra. In this course, the students will learn how to work with vector spaces, manipulate matrices and solve systems of linear equations. In particular, the students should learn to recognize vector spaces, and compute their bases, express a linear transformation as a matrix, perform basic matrix manipulations, compute the determinant of a matrix, use the Gram-Schmidt process, compute eigenvalues and eigenvectors and diagonalize (orthogonally) a (symmetric) matrix, classify quadratic forms,…

9. Higher mathematics for engineers 1

Credits: 3 (3/0/6)
Prerequisite courses: Calculus 1, 2, 3
Course description:
This course provides the basic knowledge about first order differential equations; models using first order differential equations; higher order differential equations; models using higher order differential equations; Laplace transformation; Series solutions of linear differential equations.

10. Higher mathematics for engineers 2

Credits: 3 (3/0/6)

Prerequisite courses: Higher mathematics for engineers 1

Course description:

This course provides the basic knowledge about linear algebra; system of differential equations, Fourier series and solutions to boundary-value problems for partial differential equations.

11. Mathematics for engineers

Credits: 3 (3/0/6)

Prerequisite courses: Calculus 1, 2, 3

Course description:

This course provides the basic knowledge about first-order differential equations; models with first-order differential equations; higher-order differential equations; models with higher-order differential equations; the Laplace transform; linear algebra, and Fourier series.

12. Physics 1

Credits: 3(3/0/6)

Prerequisites: *None*

Course Description:

This course provides students with the fundamental physics including classical mechanics, fluid mechanics, mechanical oscillations and waves, and thermodynamics. Besides that, the course will also help students to understand how to build mathematical models based on experimental results and know how to analyze, to write, to present as well as to develop a specific model based on the recorded data. The content of the course consists of chapters from 1 to 22 in the book "Physics for Scientists and Engineers with Modern Physics", 9th edition of R.A. Serway and J.W. Jewett.

13. Physics 2

Credits: 3(3/0/6)

Prerequisites: *Physics 1, Physics – Laboratory 1*

Course Description:

This course provides students with the basic knowledge of physics including electricity, magnetism, light and optics, which is compulsory to access specialized courses in science, engineering and technology branches.

The content of the module consists of chapters 23 to 38 of the book "Physics for Scientists and Engineers with Modern Physics", 9th edition of R.A. Serway and J.W. Jewett.

14. Physics 3

Credits: 3(3/0/6)

Prerequisites: *Physics 1, Physics 2, Physics – Laboratory 1, Physics – Laboratory 2*

Course Description:

This module provides students with the basics of modern physics, including relativity, quantum mechanics, atomic physics, molecules and solids, nuclear structure, and particle physics. Physics 3 forms the basis for access to university-level specialized subjects in science, engineering and technology. Students will be equipped with knowledge of phenomena in the natural world and apply those knowledges in scientific research, and technical and technology development.

The content of the module includes chapters 39 to 46 in the book Physics for scientists and engineers with modern physics, the 9th edition of R.A. Serway and J.W. Jewish.

15. Physics - Laboratory 1

Credits: 1(0/1/6)

Prerequisite: *Physics 1*

Course Description:

This course provides students with 9 physical experiments related to kinetics, dynamics, rotational motion and thermodynamics as a basic knowledge for approaching major college subjects of science, engineering and technology. The course helps students verify the laws of physics, gain a deeper

understanding of what they learned in Physics 1. The module also trains students skills to observe, conduct experiments, measure, analyze, and process the collected data.

16. Physics - Laboratory 2

Credits: 1(0/1/6)

Prerequisites: *Physics 1, Physics 2, Physics – Laboratory 1*

Course Description:

This course provides students with 9 physical experiments related to electromagnetism and optics as a basic knowledge for approaching major college subjects of science, engineering and technology. The course helps students verify the laws of physics, gain a deeper understanding of what they learned in Physics 2. The module also trains students skills to observe, conduct experiments, measure, analyze, and process the collected data.

17. General Chemistry for Engineers

Credits: 1(0/1/6)

Prerequisites: *High school chemistry*

Course Description:

This course is intended to provide engineering students with a background of important concepts and principles of chemistry, including atomic and molecular structures, states of matter, chemical thermodynamics, kinetics, equilibria, and electrochemistry. Emphasis will be placed on problem solving and engineering applications.

This course will be using an online learning management system (LMS) with all reading materials, homeworks

FUNDAMENTAL MECHANICAL ENGINEERING COURSES

1. Introduction to Mechanical Engineering Credits: 3 (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)

2. Descriptive Geometry and Engineering Drawing Credits: 4(3+1)

- *Course workload: 4 (3, 1, 8)*
- *Prerequisite:*
- *Course description:*This course provides students fundamental theory of engineering drawing, including: engineering drawing standards, basic drawing skills and drawing principles,

methods of representation, orthographic projection; and cultivates the abilities of writing and reading engineering drawing.

- *Textbook:*

[1]. David A. Madsen, David P. Madsen, Engineering Drawing and Design, 6rd edition, Cengage Learning, 2016

[2]. K.L. Narayana, P. Kannaiah, K. Venkata Reddy, Machine drawing, 3rd edition, New Age International Publishers

3. Engineering Mechanics **Credits: 3**

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite:*
- *Course description:*This course provides fundamental knowledge of mechanical engineering. In this course, 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.
  + ***Dynamics***: physical laws, theorems of dynamics, D'Alambert principles, Lagrange equations.
- *Textbook:* Hibbeler. Engineering Mechanics, 13th Edition, Prentice Hall

4. Mechanics of Materials
Credits: 3

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite:*
- *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, its load capacity and deformations.
- Text book: Hibbeler. Mechanics of Materials, 9th Edition, Prentice Hall, 2013.

5. Mechanisms and Machine Components Design
Credits: 3

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite:*
- *Course description:*This course study structures, working principles and calculating methods of kinematic, dynamic designs of machine and mechanism, standard mechanical joints and components. At the end of the course, students can independently solve calculating problems and machine design problems,
- *Text book:*

  [1] Machine Design: Theory and Practice, W. J. Michels & Ch. E. Wilson & A. D. Deutschman, Macmillan; 1st edition (1975)

  [2] Machine Elements in Mechanical Design (5th Edition), Robert L. Mott, Pearson; 5thedition (March 29, 2013)

6. Machine Design Project **Credits: 1**

- *Course workload:* *1 (0, 1, 2)*
- *Prerequisite:*
- *Course description:* In this course, student will apply the knowledge in course "Theory of machine and machine design" for designing a machine or a module of machine. The application knowledge includes: kinematic, dynamic designs of machine and mechanism, standard mechanical joints and components. At the end of the course, students can independently solve calculating problems and machine design problems
- *Text book:*

[1] Machine Design: Theory and Practice, W. J. Michels & Ch. E. Wilson & A. D. Deutschman, Macmillan; 1st edition (1975)

[2] Machine Elements in Mechanical Design (5th Edition), Robert L. Mott, Pearson; 5th edition (March 29, 2013)

7. Tolerances and Measuring Techniques **Credits: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite: None*
- *Course description:*This course provides a foundation for
  + Interchangeability in machine manufacturing engineering. Tolerance and common fits in machine manufacturing engineering such as smooth cylindrical fits, keys and spline fits, thread fits, method of solving the dimension chain exercises and basic principles to draw dimension on detail drawings, some measuring equipment and methods to measure the basic parameters of mechanical parts.
  + E*xperiments on Mechanical Measurement Techniques* mentions methods to measure basic parameters of mechanical parts; introduces tools, equipment, precision and manipulation; calculates and processes measuring results.
- *Textbook:*

[1]. Geometrical Dimensioning and Tolerancing for Design, Manufacturing and Inspection, 2nd edition

[2]. K.L. Narayana, P. Kannaiah, K. Venkata Reddy, Machine drawing, 3rd edition, New Age International Publishers

8. Engineering Materials **Credits: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite: None*
- *Course description:* the subject provides students:
  + General knowledge of properties of metal and metallic alloy, metallic materials in manufacturing, general knowledge of heat treating to manipulate mechanical properties of metallic materials.
  + Fundamentals of structure and properties of polymer, composite materials, rubber…
- *Textbook: Materials Science and Engineering: An Introduction, 8th Edition, Williams D. Callister, Jr., David G. Rethwisch, John Wiley & Sons, Inc.*

9. Basic of Computer Aided Design (CAD) **Credits: 3 (2+1)**

- *Course workload:* *3 (2, 1, 6)*
- *Prerequisite: None*
- *Course description:* This course equips students with foundations of CAD in mechanical engineering, trains the ability of creating and reading technical drawing, outlines the first step for students to use computer technology for design.
- *Textbook:*

[1]. Onwubolu, Godfrey, Computer-Aided Engineering Design with SolidWorks, 2013.

[2]. Planchard, Engineering Graphics with SOLIDWORKS 2015, SDC Publications, 2014.

[3]. H. Shih, Autodesk Inventor 2015 and Engineering Graphics, SDC Publications, 2014.

10. Fundamentals of Machinery Manufacturing Technology **Credits: 3**

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite: None*
- *Course description:* This course provides the basic knowledge of
  + Metal cutting, fundamentals of machining methods

+ Machining accuracy and quality of machine part surface, effect factors and how to reduce the influence
+ Locations and setup
+ Specification of machining process on machine tool, special machine, etc...

− *Textbook:*

[1] Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering), Taylor and Fracis, 2016;
[2] B. L. Juneja, Fundamentals of Metal Cutting and Machine Tools, New Age International, 2003;
[3] Hassan Abdel-Gawad El-Hofy, Fundamentals of Machining Processes: Conventional and Nonconventional, CRC Press, Aug 6, 2013

11. Thermal Engineering **Credits: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite: None*
- *Course description:* This course provides a fundamental knowledge of thermal dynamics and heat transfer, introduces student to common thermal instruments such as: dryer/dehydrator, steam boiler, heat exchanger.
- *Textbook:* Introduction to Thermal Systems Engineering: Thermodynamics, Fluid Mechanics, and Heat Transfer, Michael J. Moran, Howard N. Shapiro, Bruce R. Munson, David P. DeWitt, Wiley; 8/18/02 edition (September 17, 2002)

12. Electrical and Electronics Engineering **Credits: 3**

- *Course workload:* *3(3:0:6)*
- *Prerequisite:None*
- *Course description:* This course equips students with knowledge of electrical circuit, circuit design, 1-phase and 3-phase AC circuits. Working principles and calculation methods of current regulator, synchronous motor, asynchronous motor, DC motor. Working principles and calculation methods of basic electrical and electronics components such as diode, transistor BJT, MOSFET, SCR, TRIAC, Opamp.
- *Textbook:* Stephen Herman, Industrial Motor Control, Clifton Park, NY: Delmar Cengage Learning, 2014

13. Electrical and Electronics Engineering Laboratory **Credits: 1**

- *Course workload:* 1*(0:1:2)*
- *Prerequisite: None*
- *Course description:* This course equips students with knowledge of electrical devices, electronic components, enhances the ability to use and select electrical devices, ability to install residential and industrial electrical system, ability to assemble a circuit and measure basic electrical parameters.
- *Textbook:* Stephen Herman, Industrial Motor Control, Clifton Park, NY: Delmar Cengage Learning, 2014

14. Computer Fluid Dynamic **Credits: 3**

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite: None*
- *Course description:* This course provides fundamental knowledge of fluid statics, kinematics and dynamics, analysis of ideal fluid motion and its practical application.
- Textbook: Fundamentals of Fluid Mechanics, Bruce R. Munson, Alric P. Rothmayer, Theodore H. Okiishi, Wade W. Huebsch, Wiley; 7th edition (May 15, 2012)

ADVANCED MECHANICAL ENGINEERING COURSES

1. Machine Manufacturing Technology **Credits: 4**

- *Course workload:* *4 (4, 0, 8)*
- *Prerequisite: None*
- *Course description:* This course provides students with the knowledge of procedure of technology process and making fixtures for manufacturing machine parts; introduces about typical manufacturing processes as well as assembly technology.
- *Textbook*: Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997; [2] Manufacturing Technology: P. N. Rao, Metal Cutting and Machine Tools, Tata McGraw-Hill Education, 2000

2. Project Machinery Manufacturing Technology **Credits: 1**

- *Course workload:* *1 (0, 1, 2)*
- *Prerequisite: None*
- *Course description:* This course gives students a chance for application studied knowledge to make a manufacturing process with a specific machine part.
- *Textbook:*

[1] Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997

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

3. Manufacturing Process Automation **Credits: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite:*
- *Course description:* This course provides knowledge of structure of an automatic control system, shows student how to use sensors, actuators, PLC in building an automated manufacturing process. This course also introduces students to PLC programming and application of PLC in manufacturing process automation.
- *Textbook:* Serope Kalpakjian, Steven Schmid, Manufacturing Engineering and Technology, SI Edition 7 Ed., PEARSON, 2013.

4. Experiments in Manufacturing Process Automation **Credits: 1**

- *Course workload:* *1 (0, 1, 2)*
- *Prerequisite: None*
- *Course description*: This course helps students reinforce their knowledge of manufacturing process automation, the use of sensors, motors, pneumatic/hydraulic valves in control system, working principles of elements of automatic control, install and program PLC, connect PLC with peripheral devices.
- *Textbook:*

[1] Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering), Taylor and Fracis, 2016;

[2] B. L. Juneja, Fundamentals of Metal Cutting and Machine Tools, New Age International, 2003;

[3] Hassan Abdel-Gawad El-Hofy, Fundamentals of Machining Processes: Conventional and Nonconventional, CRC Press, Aug 6, 2013

[4] Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997;

[5] Manufacturing Technology: P. N. Rao, Metal Cutting and Machine Tools, Tata McGraw-Hill Education, 2000

5. Mold Design and Fabrication **Credits: 3**

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite: None*
- *Course description:* This course introduces to students the mold and its applications, provides knowledge of molding design and fabrication procedures such as: injection molding, hot die, cold die, etc.

- *Textbook:* How to Make Injection Molds, G Menges, Georg Menges, Menges, Walter Michaeli , Paul Mohren, P Mohren, Hanser Gardner Publications; 3rd ed. edition (January 1, 2001)

6. Maintenance in Industry **Credits: 3 (2+1)**

- *Course workload:* *3 (2, 1, 6)*
- *Prerequisite: None*
- *Course description:* This course provides a foundation for:

✓ Organization and management of industrial maintenance
✓ Scheduling maintenance for a specific industrial equipment
✓ Planning removable machine parts
✓ Adjusting the system of industrial equipment
✓ Maintenance equipment clusters as planned
✓ Practice maintenance of industrial machinery and equipment to equip students with the knowledge and skills to be able to carry out maintenance activities, maintenance of structures, machine parts in accordance with procedures and safety ...

- Textbook:

Maintenance in Transition, Paul Tomlingson, Independent Publisher Services (February 28, 2014)

7. Nano technology **Credits: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite:*
- *Course description:* this course provides students fundamental knowledge on the science of making material and functional structures in nano scale; present the contemporary and future applications of nano technology. Students are equipped with basic knowledge for the structure of nano material as well as their processing procedure. Understand the physical, biochemical and other characteristics of nano structures when they are investigated in different scale.
- *Textbook:*

Nanostructures and Nanotechnology, Douglas Natelson, Cambridge University Press; 1 edition (August 3, 2015)

8. CAD/CAM-CNC **Credits: 3 (2+1)**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite: None*
- *Course description:* the subject provides students

✓ Fundamentals of CAD/CAM solution.
✓ Basic skills: selection of machining processes order, cutting tool selection and CNC programming.
✓ Approaching methods for the utilization of CAD/CAM software.

- *Textbook:*

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: 3**

- *Course workload:* *3 (3, 0, 6)*
- *Prerequisite:*
- *Course description:* *provide students with basic knowledge of:*
  - Basic and special configuration;
  - Structural and kinetic schemes, general equations;
  - Adjusting and control.
  + Concepts and knowledge about NC and CNC machines according Numerical Control, Computer Numerical Control, interpolation, motion systems, special devices.
- *Textbook:*

Computer Numerical Control: Concepts & Programming, Warren Seames, Cengage Learning; 4 edition (August 1, 2001)

10. Pneumatic - Hydraulic Technology **Credits: 3**

- *Course workload:* *3 (3,0,6)*
- *Prerequisite:*
- *Course description:* This course provides basic knowledge 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; introduces components, basic principles in design pneumatic/hydraulic control system, fault detection and maintenance for pneumatic/hydraulic system.
- *Textbook:*

Jagadeesha T, Hydraulics and Pneumatics, I K International Publishing House (November 16, 2015)

11. Industrial Robots **Credit: 2**

- *Course workload:* *2 (2, 0, 4)*
- *Prerequisite: None*
- *Course description:* This course provides knowledge of robots and its applications in automated manufacturing, services, and daily life. Based on this knowledge, students can quickly approach and efficiently exploit the advantages of robot in different areas.
- Text book:
  Saeed B. Niku, Introduction to Robotics: Analysis, Systems, Applications, Wiley; 3th edition (September 22, 2011)

WORKSHOP

1. Practice of Metalworking **Credits: 2**

- *Course workload:* *2 (0, 2, 4)*
- *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, measuring equipment;
- *Textbook:*

[1] Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering),Taylor and Fracis, 2016;
[2] B. L. Juneja, Fundamentals of Metal Cutting and Machine Tools, New Age International, 2003;
[3] Hassan Abdel-Gawad El-Hofy, Fundamentals of Machining Processes: Conventional and Nonconventional, CRC Press, Aug 6, 2013
[4] Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997;
[5] Manufacturing Technology: P. N. Rao, Metal Cutting and Machine Tools, Tata McGraw-Hill Education, 2000

2. Welding Practice **Credits: 2**

- *Course workload:* *2 (0, 2, 4)*
- *Prerequisite: None*
- *Course description:* This course introduces students to the definition, operating principles of arc welding, welding sticks, operating principles of TIG, MIG system
- *Text book:* Welding: Principles and Applications 7th Edition, Larry Jeffus, Cengage Learning; 7th edition (May 12, 2011).

3. Practice of Turning **Credits: 3**

- *Course workload:* *3 (0, 3, 6)*
- *Prerequisite:*
- *Course description:* This course provides basic knowledge and skills in turning, grinding.

- *Textbook:*

[1] Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering), Taylor and Francis, 2016;
[2] B. L. Juneja, Fundamentals of Metal Cutting and Machine Tools, New Age International, 2003;
[3] Hassan Abdel-Gawad El-Hofy, Fundamentals of Machining Processes: Conventional and Nonconventional, CRC Press, Aug 6, 2013
[4] Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997;
[5] Manufacturing Technology: P. N. Rao, Metal Cutting and Machine Tools, Tata McGraw-Hill Education, 2000

4. Practice of Milling **Credits: 2**

- *Course workload:* *2 (0, 2, 4)*
- *Prerequisite:*
- *Course description:* This course provides basic knowledge and skills in milling.
- *Textbook:*

[1] Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering),Taylor and Francis, 2016;
[2] B. L. Juneja, Fundamentals of Metal Cutting and Machine Tools, New Age International, 2003;
[3] Hassan Abdel-Gawad El-Hoffy, Fundamentals of Machining Processes: Conventional and Nonconventional, CRC Press, Aug 6, 2013
[4] Steve Krar, Machine Tool and Manufacturing Technology, Willey, 1997;
[5] Manufacturing Technology: P. N. Rao, Meal Cutting and Machine Tools, Tata McGraw-Hill Education, 200

5. Internship **Credits: 4**

- *Course workload:* *4 (0, 4, 8)*
- *Prerequisite:*
- *Course description:*The course helpsstudents to strengthen and improve knowledge has equipped in learning time at university. Initially apply specialized knowledge to solve real problems in practice content. Practicing the skills of an engineer, building styles and working methods of electronic engineers in professional activities. Train the ability, analysis, synthesis, proposals and solve problems with the soft skills

GRADUATION PROJECT

Graduation Thesis **Credits: 7**

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 of practice
= 45 hours of 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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