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TRƯỜNG ĐẠI HỌC

SƯ PHẠM KỸ THUẬT TP. HỒ CHÍ MINH

KHOA ĐÀO TẠO QUỐC TẾ

UNDERGRADUATE CURRICULUM MANUAL

MECHANICAL ENGINEERING TECHNOLOGY

Program Chair: Vu Quang Huy

2021

MECHANICAL ENGINEERING TECHNOLOGY

I. CURRICULUM

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	EHQT130137E	Academic English 1	3	
5	EHQT230237E	Academic English 2	3	
6	INME130125E	Introduction to Mechanical Engineering	3	
7	MATH132401E	Calculus 1	3	
8	PHYS130902E	Physics 1	3	
Total			20	

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	LLCT120314E	Ho Chi Minh's ideology	2	
5	EHQT230337E	Academic English 3 (3TC)	3	
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		Option Course - General Knowledge	2	
Total			23	

3rd Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	LLCT220514E	History of Vietnamese communist party	2	
2	PHED130715E	Physical Education 3	0	
3	EHQT230437E	Academic English 4	3	
4	TEEN123725E	Technical English 1	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	
		Option Course - Foundation Knowledge (11)	2	
Total			24	

4th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Option Course - Foundation Knowledge	3	
2	TEEN233825E	Technical English 2	3	
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			24	

5th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Optional Course - Foundation Knowledge	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		Option Course - Expertise Knowledge	9	
Total			22	

7th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1		Optional Course - Expert Knowledge	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	

ELECTIVE COURSES**(*) Foundation science courses (2 credits)**

No.	Course ID	Course Title	Credits	Semester	Note
1	GEEC220105E	General Economics	2	4	Student chooses 1 course
2	INMA220305E	Introduction to Management	2		
3	INLO220405E	Introduction to Logic	2		
4	ULTE121105E	Learning Methods in University	2		
5	SYTH220505E	Systematic Thinking	2		
6	PLSK320605E	Planning Skill	2		
7	IVNC320905E	Introduction to the 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	EEEE421925E	Electrics and Electronics in Industrial Machines	2		
5	ELDR312025E	Experiments in Electrics and Electronics in Industrial Machines	1		
6	MEVI220820E	Mechanical Vibrations	2		
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		

II. COURSE DESCRIPTIONS

Introduction to Mechanical Engineering

Credits: 3 (2+1)

Prerequisites: None

Course Description: The goal of this course is to provide first-year students with a broad outline of mechanical engineering and the skills needed to explore different disciplines of engineering.

Textbook:

- 1) Moaveni, Saeed. *Engineering Fundamentals: An Introduction to Engineering*. 3rd ed., CL-Engineering, 2007.
- 2) Wickert J., and K. Lewis. *An Introduction to Mechanical Engineering*. 3rd ed., CL Engineering, 2012.

Mechanical Engineering Drawing

Credits: 4 (3+1)

Prerequisites: 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.

Textbook:

- 1) Madsen, David A., and David P. Madsen. *Engineering Drawing and Design*. 6th ed., Cengage Learning, 2016.
- 2) Narayana, K. L., P. Kanniah, and K. Venkata Reddy. *Machine Drawing*. 3rd ed., New Age International Publishers, 2009.

Engineering Mechanics

Credits: 3

Prerequisites: 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. Russel C. *Engineering Mechanics*. 12th ed., Prentice Hall, 2010.
- 2) Meriam, J. L., and L. G. Kraige. *Engineering Mechanics*. 7th ed., John Wiley & Sons Inc., 2006.

Mechanics of Materials

Credits: 3

Prerequisites: Engineering 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, its 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.

Mechanisms and Machine Components Design

Credits: 3

Prerequisites: Mechanics 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.

Textbook:

- 1) Michels, W. J., Ch. 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.

Machine Design Project

Credits: 1

Prerequisites: Mechanisms and Machine Components Design

Course Description: In this course, students will apply the knowledge gained in the course “Mechanisms and Machine Components 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.

Textbook:

- 1) Michels, W. J., Ch. 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.

Measuring Techniques and Tolerances

Credits: 2

Prerequisites: 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, 2009.

Materials Science

Credits: 2

Prerequisites: 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, Williams D. Jr., and David G. Rethwisch. *Materials Science and Engineering: An Introduction*. 8th ed., John Wiley & Sons, 2009.

Basics of Computer-Aided Design (CAD)

Credits: 3 (2+1)

Prerequisites: None

Course Description: This course provides the learner with the foundations of CAD in mechanical engineering, trains the ability to create and read technical drawing, and outlines the first steps for students to use computer technology for design.

Textbooks:

- 1) Onwubolu, Godfrey. *Computer-Aided Engineering Design with SolidWorks*. Imperial College Press, 2013.
- 2) Planchard, David C. *Engineering Graphics with SOLIDWORKS 2015*. SDC Publications, 2014.
- 3) Shih, H. *Autodesk Inventor 2015 and Engineering Graphics*. SDC Publications, 2014.

Fundamentals of Machinery Manufacturing Technology

Credits: 3

Prerequisites: None

Course Description: This course provides the learner with the fundamentals of metal cutting, machining methods, machining accuracy, 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) 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.

Thermal Engineering

Credits: 2

Prerequisites: 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.

Electrical and Electronics Engineering

Credits: 3

Prerequisites: 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.

Practice of Electrical and Electronics Engineering

Credits: 1

Prerequisites: None

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*. Delmar Cengage Learning, 2014.

Computer Fluid Dynamic

Credits: 3

Prerequisites: None

Course Description: This course provides the learner with the following contents: fluid statics, kinematics and dynamics, analysis of ideal fluid motion and its practical application.

Textbook:

- 1) Munson, Bruce R., et al. *Fundamentals of Fluid Mechanics*. Wiley, 7th ed., 2012.

Machinery Manufacturing Technology

Credits: 4

Prerequisites: None

Course Description: This course introduces the learner with the procedure of technology process, including making fixtures for manufacturing machine parts, 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.

Machine Manufacturing Technology Project

Credits: 1

Prerequisites: 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.

Textbook:

- 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.

Manufacturing Process Automation

Credits: 2

Prerequisites: None

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.

Experiments in Manufacturing Process Automation

Credits: 1

Prerequisites: 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, how to 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., 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.

Mold Design and Fabrication

Credits: 3

Prerequisites: None

Course Description: This course introduces students to molding design and fabrication procedures such as injection molding, hot die, cold die, etc., as well as its applications.

Textbook:

- 1) Menges, G., W. Michaeli, and P. Mohren. *How to Make Injection Molds*. 3rd ed., Hanser Gardner Publications, 2001.

Maintenance in Industry

Credits: 3 (2+1)

Prerequisites: 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) Tomlison, Paul. *Maintenance in Transition*. Independent Publisher Services, 2014.

Nanotechnology

Credits: 2

Prerequisites: 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 procedures. 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.

CAD/CAM-CNC

Credits: 3 (2+1)

Prerequisites: 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

Numerical Control Systems

Credits: 3

Prerequisites: None

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.

Pneumatic - Hydraulic Technology

Credits: 3

Prerequisites: None

Course Description: This course provides the learner with an understanding of operating principles of a pneumatic control system, electropneumatics, hydraulics, electrohydraulics, 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.

Industrial Robots

Credit: 2

Prerequisites: None

Course Description: This course provides knowledge about 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 robots in different areas.

Textbook:

- 1) Niku, Saeed B. *Introduction to Robotics: Analysis, Systems, Applications*. 3rd ed., Wiley, 2011.

Metalworking Practice

Credits: 2

Prerequisites: 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., 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.

Welding Practice

Credits: 1

Prerequisites: None

Course Description: This course introduces students to the operating principles of arc welding, welding sticks, operating principles of TIG, MIG system, etc.

Textbook:

- 1) Jeffus, Larry. *Welding: Principles and Applications*. 7th ed., Cengage Learning, 2011.

Turning Practice

Credits: 3

Prerequisites: None

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., 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.

Milling Practice

Credits: 2

Prerequisites: None

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., 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.

Internship

Credits: 4

Prerequisites: None

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-world problems while practicing the skills, building styles, and working methods of mechanical engineers. Furthermore, the goal is to train the students' abilities in the domain of analysis, synthesis, proposals and problem-solving using soft skills.

Textbook: None

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 research topic of current interest.