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TRƯỜNG ĐẠI HỌC

SƯ PHẠM KỸ THUẬT TP. HỒ CHÍ MINH

KHOA ĐÀO TẠO QUỐC TẾ

UNDERGRADUATE CURRICULUM MANUAL

MACHINE MANUFACTURING TECHNOLOGY

Program Chair: Vu Quang Huy

2021

MACHINE MANUFACTURING TECHNOLOGY

I. CURRICULUM

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	EHQT130137E	Academic English 1 (3TC)	3	
5	EHQT230237E	Academic English 2 (3TC)	3	
6	INME130125E	Introduction to Mechanical Engineering (3+1)	4	
7	MATH132401E	Calculus 1	3	
8	GELA220405E	General Law	2	
Total			21	

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	LLCT120314E	Ho Chi Minh's Ideology	2	
6	ENMA220230E	Engineering Materials	2	
7	MEDR141123E	Mechanical Engineering Drawing (3+1)	4	
8	PHYS111202E	Physics - Laboratory 1	1	
9	MATH132501E	Calculus 2	3	
10	ENME130620E	Engineering Mechanics	3	
11	EHQT230337E	Academic English 3 (3TC)	3	

Total	23	
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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	TEEN123725E	Technical English 1	2	
7		Option Course - General Knowledge	2	
8	MATH132601E	Calculus 3	3	
9	MATH132901E	Mathematical Statistics for Engineers	3	
10	MEMA230720E	Mechanics of Materials	3	
11	EHQT230437E	Academic English 4 (3TC)	3	
Total			23	

4th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	TEEN233825E	Technical English 2	3	
2	GCHE130603E	General Chemistry for Engineers	3	
3	MMCD230323E	Mechanisms and Machine Components Design	3	
4	METE224230E	Metal Technology Công nghệ kim loại	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			21	

5th Semester

No.	Course ID	Course Title	Credits	Prerequisite
1	MDPR310423E	Machine Design Project	1	
2	MTNC330925E	Machines and Numerical Control Systems	3	
3	EEEEI421925E	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		Option Course - Foundation Knowledge	3	
Total			23	

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	2	
8	PCNC422125E	Practice of CNC	3	
9		Option Course - Foundation Knowledge	4	
10		Option Course - Expertise Knowledge	5	
Total			19	

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		Option Course - 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	5, 6	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	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	6,7	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	IFEM230220E	Introduction to Finite Element Method (2+1)	3		
7	INDE434025E	Inverse Design (2+1)	3		

II. COURSE DESCRIPTION

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.

Mechanical Engineering Drawing

Credits: 4 (3+1)

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. Kanniah, and K. Venkata Reddy. *Machine Drawing*. 3rd ed., New Age International Publishers, 2008.

Engineering Mechanics

Credits: 3

Prerequisite: Physics I

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.

Mechanics of Materials

Credits: 3

Prerequisite: 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, 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.

Mechanism and Machine Components Design

Credits: 3

Prerequisite: 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.

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.

Machine Design Project

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.

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. Kanniah, and K. Venkata Reddy. *Machine Drawing*. 3rd ed., New Age International Publishers, 2008.

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.

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.

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.

Electrical and Electronic Engineering

Credits: 3

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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

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.

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.

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.

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.

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.

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, 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

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.

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.

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.

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.

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.

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.

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.

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.

Internship

Credits: 2

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.

Graduation Thesis

Credits: 10

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.