

Training major: MECHANICAL ENGINEERING TECHNOLOGY

1. **Awarding institution:** HCMC University of Technology and Education
2. **Name of the final award:** Bachelor of Engineering (Mechanical Engineering Technology)
3. **Programme Title:** Mechanical Engineering Technology
4. **Mode of delivery:** Full time
5. **Training time:** the normal period of study is 4 years and the maximum period is 8 years.
6. **Admission criteria or requirements to the programme:**

In order to get admission to the MET programme, high school candidates have to take the National High School Graduation Examination that is held annually on June by MoET. The MET programme enrolls students in one of four groups: Group “A00” with 3 subjects (Mathematics, Physics, and Chemistry), Group “A01” with 3 subjects (Mathematics, Physics, and English), Group “D01” with 3 subjects (Mathematics, Literature, and English) and Group “D90” with 3 subjects (Mathematics, English, and Natural Science). The cumulative testing grade of candidates must be higher than the cut-off score set by the university based on the student admission quota from MoET. Additionally, FME reserves the maximum 25% of the annual admission quota for candidates who have graduated from specialized high school or won the prizes in the National Academic Examination, and for those who have international English certificates such as IELTS or TOEFL with good and excellent records.

7. **Programme aim:**

The aim of MET programme is to graduate the Mechanical Engineers who have advanced knowledge and skills in the design, manufacturing and management of machinery, production as well as appropriate professional attitudes adapted to the development requirements of the major and society.

8. **Programme objectives:**

The objectives of the MET programme are to prepare students to:

1. Possess and apply the general knowledge, the fundamental and specialized knowledge of Mechanical Engineering Technology.
2. Execute critical thinking and problem solving skills and professional skills and contribute to progress within their field.
3. Adapt effectively in the professional environment in a global and societal context and be aware of lifelong learning.
4. Conceive, design, implement and operate successfully mechanical engineering systems.

9. **Expected learning outcomes of the programme**

After successful completion of the programme, students will be able to:

ELO 1: Use general knowledge of mathematics, science and information technology to learn professional knowledge and pursue higher education.

ELO 2: Apply the fundamentals of mechanical engineering knowledge in reality.

ELO 3: Analyze and solve mechanical engineering problems.

ELO 4: Measure and interpret experimental data related to mechanical engineering in terms of professional skills.

ELO 5: Lead and work effectively in individual and group-oriented settings.

ELO 6: Communicate effectively in different forms, such as writing, multimedia, graphics, and presentation.

ELO 7: Demonstrate the ability to use English in mechanical engineering, emphasizing on reading and writing skills.

ELO 8: Exhibit life-long learning capacity.

ELO 9: Appreciate different enterprise cultures, demonstrate professional behaviors and work successfully in industrial organizations.

ELO 10: Conceive, plan and manage the projects in accordance with the industrial requirements.

ELO 11: Design and stimulate technological equipment and processes.

ELO 12: Manufacture parts and machinery by CNC machines.

ELO 13: Operate and maintain CNC systems.

10. Course workload (Credits) : 150 credits (*excluding Physical Education and Military training courses*)

11. Teaching and learning method: Students are encouraged to build their own understanding of the world by investigating and experiencing on their own under the coaching of instructors. The institution appreciates the core values of life-long learning by providing students with opportunities for a comprehensive development of cognitive, social and behavioural competencies. Through the learning process, individuals are stimulated to explore themselves and take the learning activities as a tool to fulfil their own aspirations and to serve the community.

12. Student assessment method: Student assessment in each course includes formative assessment and summative assessment with the weight distribution is divided equally, 50% for formative and 50% for summative assessment. The formative assessment is done in many times during the course and with many different methods. The summative assessment normally occurs at the end of course and measures the extent to which students have achieved the expected learning outcomes. Various types of assessment such as oral presentations, homeworks, exercises, multiple-choice questions, online questions and quizzes, written tests, laboratory tests, group work, course projects, etc. have been applied.

13. Programme structure:

Semester	Course Code	Course Name	Number of Credits		
			Total	Practice	Theory
1	MATH130101	Advanced Mathematics A1	3	0	3
	MATH130201	Advanced Mathematics A2	3	0	3
	ENGL130137	English 1	3	0	3
	GCHE130103	General Chemistry A1	3	0	3
	INME130125	Introduction to Mechanical Engineering	3	1	2
	VBPR131085	Visual Basic Programming	3	1	2
	GELA220405	General Laws	2	0	2
	PHYS130102	Fundamental Physics A1	3	0	3
	PHED110513	Physical Education 1	1	0	1
2	MATH130301	Advanced Mathematics A3	3	0	3
	DGED121023	Descriptive Geometry and Engineering Drawing	2	0	2

	MATH130401	Probabilities & Statistics	3	0	3
	LLCT150105	Basic principles of Marxism & Leninism	5	0	5
	ENGL230237	English 2	3	0	3
	PHYS120202	Fundamental Physics A2	2	0	2
	(Elective)	General knowledge course 1	2	0	2
	MHAP120227	Mechanical Works Practice	2	2	0
	PHED110613	Physical Education 2	1	1	0
3	LLCT120314	Ho Chi Minh's Ideology	2	0	2
	PHYS110302	Experiment of General Physics	1	0	1
	ENGL330337	English 3	3	0	3
	THME230721	Mechanics in Engineering	3	0	3
	MEED241320	Mechanical Engineering Drawing	4	1	3
	ENMA220126	Materials Science	2	0	2
	TOMT220225	Tolerances and Measuring Techniques	2	0	2
	EXMM210325	Experiments on Mechanical Measurement	1	1	0
	(Elective)	General knowledge course 2	2	0	2
	(Elective)	General knowledge course 3	2	0	2
	(Elective)	Physical Education 3	3	3	0
4	FMMT330825	Fundamentals of Machinery Manufacturing Technology	3	0	3
	MATE211126	Experiments on Materials Science	1	1	0
	TMMP230220	Theory of Machine and Machine design	3	0	3
	BATP230327	Basic Turning Practice	3	3	0
	STMA230521	Strength of Materials	3	0	3
	METE210321	Experiments of Mechanics	1	1	
	LLCT230214	Vietnamese Communist Party's revolutionary policies	3	0	3
	METE330126	Metal Technologies	3	0	3
	WEPR220425	Welding Practice	2	2	0
5	CACC320224	CAD/CAM-CNC	2	0	2
	ECCC310324	Experiments on CAD/CAM-CNC	1	1	0
	NUMC330424	Numerical Control Systems	3	0	3
	MATH131501	Applied Mathematics in Engineering	3	0	3
	BAMP220427	Basic Milling Practice	2	2	0
	PMMD310423	Project on Theory of Machine and Machine Design	1	1	0
	MMAT431525	Machinery Manufacturing Technology	3	0	3
	(Elective)	Fundamental knowledge course 1	3	0	3

6	ACCC330524	Advanced CAD/CAM-CNC	3	0	3
	PACC320624	Advanced CAD/CAM-CNC Practice	2	2	0
	PMMT411625	Project on Machinery Manufacturing Technology	1	1	0
	AUMP323525	Automation of Manufacturing Process	2	0	2
	EMPA313625	Experiments on Automation of Manufacturing Process	1	1	0
	ENME320124	English for Mechanical Engineering	2	0	2
	(Elective)	Fundamental knowledge course 2	2	0	2
	(Elective)	Specialized knowledge course 1	3	0	3
7	MOLD431224	Mold Design and Manufacturing	3	0	3
	PMDM421324	Practice on Mold Design and Manufacturing	2	2	0
	PTPA422224	Practice of Technology Plastic Application	2	2	0
	PNHY330529	Pneumatic & Hydraulic Technology	3	0	3
	PCNC422124	CNC Practice	2	2	0
	(Elective)	Specialized knowledge course 2	3	0	3
8	FAIN422324	Internship	2	2	0
	GRAT402424	Capstone project	10	10	0

Elective General knowledge courses: Students take at least 6 credits from the list below

- General economy (GEEC220105) (2 credits)
- Introduction to management (INMA220305) (2 credits)
- Introduction to logic (INLO220405) (2 credits)
- System thinking (SYTH220505) (2 credits)
- Plan skill (PLSK320605) (2 credits)
- Presentation skill (PRSK320705) (2 credits)
- Introduction to Vietnam culture (IVNC320905) (2 credits)
- Introduction to sociology (INSO321005) (2 credits)
- University learning technique (ULTE121105) (2 credits)

Elective Fundamental knowledge courses: Students take at least 5 credits from the list below

- Thermal Engineering (THER222932) (2 credits)
- Electrical and Electronics Engineering (EEEN230129) (3 credits)
- Digital Techniques and Microcontroller (DTMC240929) (4 credits)
- Experiments on Digital Techniques and Microcontroller (PDTM311029) (1 credit)
- Energy Source and Energy Management (ERMA321025) (2 credits)

Elective Specialized knowledge courses: Students take at least 6 credits from the list below

- Sheet Metal Forming Process (SHET331524) (3 credits)
- Application of CAE in Design (CAED321024) (2 credits)
- Practice of CAE (ECAE311124) (1 credits)
- Automatic Control (AUCO330329) (3 credits)
- Electrical Discharge Machining Technology (EDMT320824) (2 credits)

- Experiment of EDM (EEDM310924) (1 credit)
- Product design for sheet metal (PDSM431724) (3 credits)

14. Job and Post-graduate study opportunities:

Graduates from MET programme are able to:

- Work in the mechanical engineering factories and companies, in the fields of engineering services or R&D departments under the role of direct operators, facilitators or managers.
- Continue their higher study at the programme's national and international universities.

15. Date on which the programme specification was written or revised: written in February 2012 and reviewed in November 2015.

16. Programme contact:

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17. Brief description of all required courses

17.1. General education courses

1. Advanced Mathematics 1

Credits: 3

- *Distribution of learning time: 3 (3/0/6)*
- *Prerequisites: None*
- *Former subjects of condition: None*
- *Course description:* This course helps students review the general and advanced mathematical knowledge: Cardinality of a set: rational numbers, real numbers, complex numbers. Limit: function, limit of a function, continuous function. Differential calculus: derivative, differential, Taylor-Maclaurin expansion, the survey on function, curve in polar coordinates. Calculus of single variable: volume fraction uncertainty, definite integrals, generalized integrals. Chain: Chain number, string functions, power series, Taylor-Maclaurin sequence, Fourier series, Fourier expansion, trigonometric series.
- *Textbook:* K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

2. Advanced Mathematics 2

Credits: 3

- *Distribution of learning time: 3 (3/0/6)*
- *Prerequisites: None*
- *Former subjects of condition: Calculus I*
- *Course description:* This course provides the learner with contents: Matrix-determinant: the matrix, the form of matrix, inverse matrix, determinants, matrix classes. System of Linear Equations: linear systems, Cramer rule, Gauss method, homogeneous system. Space Vector: Space Vector, subspace, linear independence, linear dependence, basis, dimension, Euclidean space. Diagonal matrix-quadratic form: eigenvalues, eigenvectors, private space, diagonal matrix, quadratic form, canonical form, the surface level 2. Differential calculus of function of several variables: function of several variables, derivative, differential, extreme of function of several variables, calculus applications in geometry in space.
- *Textbook:* K. Smith, M. Strauss and M. Toda – *Calculus* - 6th National Edition–Kendall Hunt.

3. Advanced Mathematics 3

Credits: 3

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

4. Probabilities & Statistics

Credits: 3

- *Distribution of learning time:* 3 (3/0/6)
- *Prerequisites:* None
- *Former subjects of condition:* Advanced Mathematics 1
- *Course Description:* This module consists of descriptive statistics, fundamental probability, random variables and probability distribution laws, characteristics of random variables, parameter estimation, hypothesis testing, regression and analysis of variance.
- *Textbook:* Probability and Statistics for Engineering and Science by Devore, 8th Edition (published by Cengage Learning), 8th edition with Enhanced Web Assign, regular edition ISBN 1111655499

5. Principles of Physics 1

Credits: 3

- *Distribution of learning time:* 3(2/1/4)
- *Prerequisites:* None
- *Former subjects of condition:* None
- *Course description:* This course provides the learner with contents: the mechanics: point dynamics, the law of conservation, solid motion. Thermodynamics: kinetic molecular theory, principles of Thermodynamics I, principles of Thermodynamics II. Electricity and magnetism: electric field, magnetic, variability of electrical magnetic field.
- *Text book:* R.A. Serway và J.W. Jewett. Physics for Scientists and Engineers with Modern Physics, 8th Edition

6. General Chemistry for Engineers

Credits: 3

- *Distribution of learning time:* 3(2/1/4)
- *Prerequisites:* None
- *Former subjects of condition:* None
- *Course description:* This course provides general chemistry necessary for engineering and science. This course covers fundamentals of electronic structures of atoms, relationship of electron and atomic properties, geometric configuration of the molecule, the polarity of the molecules, link of the physical molecules, a preliminary study on the physical and chemical properties of inorganic substances and their structures.

- *Text book:* Lawrence S. Brown, Chemistry for Engineering Students, Brooks/Cole, Cengage Learning, 2nd edition, 2011, 608 papers

7. Introduction to Mechanical Engineering **Credits: 3 (2+1)**

- *Distribution of learning time:* 3 (2, 1, 6)
- *Prerequisite:* None
- *Former subjects of condition:* 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] 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).

8. General Law **Credits: 2**

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with general theories of the state and law including nature of the state and law, organizing apparatus of the state, Vietnam law system and criminal and civil laws. This knowledge helps student to correctly understand and apply the laws in practice.
- *Textbook:* Le Minh Toan. General Law, National Political Publishing, 2010.

17.2. Fundamental courses

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

- *Distribution of learning time:* 4 (3, 1, 8)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with 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. Kanniah, K. Venkata Reddy, Machine drawing, 3rd edition, New Age International Publishers

2. Theoretical Mechanics **Credits: 3**

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* None

- *Course description:* This course provides students with 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

3. **Strength of Materials**

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Theoretical Mechanics
- *Course description:* This course introduces students to fundamental knowledge of strength of materials; methods of calculating the stress, strain in mechanical components, structural members under loading, its load capacity and deformations.
- *Text book:* Hibbeler. Mechanics of Materials, 9th Edition, Prentice Hall, 2013.

4. **Theory of machine and machine design**

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Strength of Materials
- *Course description:* This course studies 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; 5 edition (March 29, 2013).

5. **Project on Theory of machine and machine design**

Credits: 1

- *Distribution of learning time:* 1 (0, 1, 2)
- *Prerequisite:* None
- *Former subjects of condition:* Theory of machine and machine design
- *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; 5 edition (March 29, 2013).

6. Tolerances and Measuring Techniques

Credits: 3 (2+1)

- *Distribution of learning time:* 3 (2, 1, 6)
- *Prerequisite:* None
- *Former subjects of condition:* 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.
 - + *Experiments on Mechanical Measurement Techniques* mentions methods to measure basic parameters of mechanical parts and 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] Tran Quoc Hung. Tolerances and Measuring Techniques, HCMC National University Publishing, 2012.

7. Materials Science

Credits: 3 (2+1)

- *Distribution of learning time:* 3 (2, 1, 6)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* the subject provides students with:
 - + 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.

8. Basic of Computer Aided Design (CAD)

Credits: 3 (2+1)

- *Course workload:* 3 (2, 1, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Descriptive Geometry and Engineering Drawing
- *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.

9. Fundamentals of Machinery Manufacturing Technology

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None

- *Former subjects of condition:* Theory of machine and machine design
- *Course description:* This course provides students with 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 tools, special machines, etc...
- *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

10. Thermal Engineering

Credits: 2

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with 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)

11. Electrical and Electronics Engineering

Credits: 3

- *Distribution of learning time:* 3(3:0:6)
- *Prerequisite:* None
- *Former subjects of condition:* 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

12. Electrical and Electronics Engineering Laboratory

Credits: 1

- *Distribution of learning time:* 1(0:1:2)
- *Prerequisite:* None
- *Former subjects of condition:* Electrical and Electronics Engineering
- *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

13. Computer Fluid Dynamic

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* 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; 7 edition (May 15, 2012)

17.3. Specialized courses

1. Machinery Manufacturing Technology

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Fundamentals of Machinery Manufacturing Technology
- *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 on Machinery Manufacturing Technology

Credits: 1

- *Distribution of learning time:* 1 (0, 1, 2)
- *Prerequisite:* None
- *Former subjects of condition:* Machinery Manufacturing Technology
- *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

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* Machinery Manufacturing Technology
- *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

- *Distribution of learning time:* 1 (0, 1, 2)
- *Prerequisite:* Manufacturing Process Automation
- *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 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

5. Mold Design and Fabrication

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Machinery Manufacturing Technology
- *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)

- *Distribution of learning time:* 3 (2, 1, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Machinery Manufacturing Technology
- *Course description:* This course provides students with a foundation of:
 - ✓ 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 Tomlinson, Independent Publisher Services (February 28, 2014)

7. Nano technology

Credits: 2

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None

- *Course description:* this course provides students with 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)

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* the subject provides students with
 - ✓ Fundamentals of CAD/CAM solutions.
 - ✓ 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 Win Tutorials - Modular Instructor Guide for Industry and Training -PC Turn/Mill 55 GE Fanuc Series 21

9. Advanced CAD/CAM_CNC

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* CAD/CAM-CNC
- *Course description:* This course provides the fundamentals of:
 - CAD/CAM and CNC technology
 - Coordinate systems in CNC machine
 - ISO G, M codes in CNC programming
 - 3D objects design
 - 3D models assembly
 - CAM (design, simulation, modification, G-code generation)
 - Relationship between CAD-CAM and CNC.
- *Textbook:* CNC Programming Handbook: A Comprehensive Guide to Practical CNC Programming - Industrial Press Inc., 2003

10. Numerical Control Systems

Credits: 3

- *Distribution of learning time:* 3 (3, 0, 6)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides 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)

11. Pneumatic - Hydraulic Technology

Credits: 3

- *Distribution of learning time:* 3 (3,0,6)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with basic knowledge 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; 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)

12. Industrial Robots

Credits: 2

- *Distribution of learning time:* 2 (2, 0, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with 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).

17.4. Workshop

1. Practice of Metalworking

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* None
- *Former subjects of condition:* None
- *Course description:* This course provides students with basic knowledge and skills in metalworking with hand tools and basic equipments such as punchers, chisels, files, drills, measuring equipment;
- *Textbook:* Winston A. Knight, Fundamentals of Metal Machining and Machine Tools, Third Edition (CRC Mechanical Engineering), Taylor and Fracis, 2016;

2. Welding Practice

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* None
- *Former subjects of condition:* Practice of Metalworking

- *Course description:* This course introduces students to the definition, operating principles of arc welding, electric welding, welding sticks, operating principles of TIG, MIG system. This practice also helps students to practice electric welding and TIG, MIG welding.
- *Textbook:* Welding: Principles and Applications 7th Edition, Larry Jeffus, Cengage Learning; 7 edition (May 12, 2011).

3. Basic Turning Practice

Credits: 3

- *Distribution of learning time:* 3 (0, 3, 6)
- *Prerequisite:* None
- *Former subjects of condition:* Welding Practice
- *Course description:* This practice helps students:
 - Master construction arrangement and principal units of turning machine.
 - Practice methods of turning and internal cylindrical surfaces, stepped cylindrical surfaces.
 - Practice methods of turning square and profile grooves, external taper surfaces.
 - Practice methods of turning right-hand external V threads.
- *Textbook:*

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

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

4. Basic Milling Practice

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* none
- *Former subjects of condition:* Welding Practice
- *Course description:* This course provides basic knowledge and skills in milling. This practice helps students:
 - Master construction arrangement and principal units of milling machine.
 - Practice methods of milling horizontal, vertical and angular surfaces, V slots, square slots, keyways, spline shafts, spur and helical gears.
- *Textbook:*

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

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

5. Advanced CAD/CAM_CNC Practice

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* Advanced CAD/CAM_CNC
- *Course description:* This course provides student with:
 - CNC manually programming
 - CNC machines operating
 - 3D Modeling
 - Assembly and Drawing
 - CAM
 - CNC machining

- *Textbook:* CNC Programming Handbook: A Comprehensive Guide to Practical CNC Programming - Industrial Press Inc., 2003

6. CNC Practice

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* Advanced CAD/CAM_CNC Practice
- *Course description:* This course equips learners with skills in CNC programming, operating and machining. Learners are able to use equipments on CNC, solve common problems on CNC operations.
- *Textbook:* CNC Programming Handbook: A Comprehensive Guide to Practical CNC Programming - Industrial Press Inc., 2003

7. Practice of Mold Design and Manufacturing

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* None
- *Former subjects of condition:* Mold Design and Fabrication
- *Course description:* This course introduces How to design a mold by CAD software, How the plastic flows inside mold and predict defects of product by CAE software ; moreover, provides learners with knowledge and skills in manufacturing mold and operate CNC machine for machining.
- *Textbook:* Lecture of Practice of Mold Design and Manufacturing.

8. Practice of Technology Plastic Application

Credits: 2

- *Distribution of learning time:* 1 (0, 1, 2)
- *Prerequisite:* None
- *Former subjects of condition:* Mold Design and Fabrication
- *Course description:* This course provides students with knowledge of industrial plastics machines, professional CAD\CAE software for flow analysis, defects in plastic products, direct generation and handling of defects of plastic products by injection molding technology.
- *Textbook:* TS. Phạm Sơn Minh, ThS. Trần Minh Thế Uyên – Thực tập công nghệ nhựa – Đại học Sư Phạm Kỹ Thuật Tp.Hồ Chí Minh – 2015

9. Internship

Credits: 2

- *Distribution of learning time:* 2 (0, 2, 4)
- *Prerequisite:* None
- *Course description:* By participating as a official member of a mechanical plant, students are able to make the acquaintance of organizing the manufacturing process in the plant and understand its management structure. This is the opportunity for students to acquire new and profound information in mechanical engineering to serve for the graduation thesis which can be from the fact-finding trip in mechanical factories.

17.5. Capstone project

Credits: 10

- *Distribution of learning time:* 10 (0, 0, 30)
- *Prerequisite:* Project on Theory of machine and machine design, Project on Machinery Manufacturing Technology
- *Course description:* Capstone project 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.

18. Campus Infrastructure

Follow the Ministry of education and training's regulations

18.1 Workshops and Laboratories:

- Mechanical Measurement Technology Laboratory
- Mechanical Engineering Workshop
- Gas Welding Workshop
- Electroslag Welding Workshop
- Computer cluster
- Simulation and Automation Laboratory
- PLC Laboratory
- Pneumatic - Hydraulic Laboratory
- Robotics Laboratory
- Process Control Laboratory

18.2 Library, Website

- University's Library and Website
- Faculty's Library and Website

19. Programme guide

Credit hour is calculated as follows:

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

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