**MINISTRY OF EDUCATION & TRAINING**

**HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION**

**UNDERGRADUATE PROGRAM**

***Major of***

**MACHINE MANUFACTURING TECHNOLOGY**

**November 2016**

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| 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**

**Education Program: MANUFACTURING TECHNOLOGY**

**Level:** Undergraduate

**Major**: **MACHINE MANUFACTURING TECHNOLOGY**

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

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

**Objectives**

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

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

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

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

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

**Program outcomes**

1. **General knowledge, fundamental and specialized knowledge of electrical and electronics major:**

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 **Machine Manufacturing Technology**.

ELO 3. Create the combination of advanced specialized knowledge in the fields of **Machine Manufacturing Technology**.

1. **Specialized and professional skills in electrical and electronics major:**

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 field.

1. **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.

1. **Skills to take shape of ideas, design, deploying and operate system of Machine Manufacturing**

ELO 13. Take shapes of ideas, set up requirements, determine functions and elements of the Power System, Renewable Energy, Machine Manufacturing, and Automatic System.

ELO 14. Design required elements of the Power System, Renewable Energy, Machine Manufacturing, and Automatic System.

**5. Blocks of knowledge in the whole program:130** 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 | **41** | **37** | **4** |
| General Politics + Laws | 10 | 10 |  |
| Social Sciences and Humanities | 4 |  | 4 |
| Mathematics and Natural Sciences | 21 | 21 |  |
| Technical Computer Sciences | 3 | 3 |  |
| Introduction to Engineering Technology | 3 | 3 |  |
| **Mechanical Engineering Courses** | **89** | **75** | **14** |
| Fundamental Mechanical Engineering courses | 33 | 24 | 9 |
| Advanced Mechanical Engineering courses | 28 | 23 | 5 |
| Experiments and Practices | 16 | 16 |  |
| Internship | 2 | 2 |  |
| Graduation thesis | 10 | 10 |  |

**7. CONTENTS OF THE PROGRAM**

**A. cOMPULSORY cOURSEs**

**7.1 Foundation science courses (44 credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | LLCT150105E | Fundamental Theory of Marxism & Leninism | 5 | 1 |  |
|  | LLCT120314E | Ho Chi Minh's Ideology | 2 | 2 |  |
|  | LLCT230214E | History of Vietnam Communist Party | 3 | 3 |  |
|  | INME130125E | Introduction to Engineering Technology | 3 | 1 | Assoc. Prof. Lê Hiếu Giang  MSc. Phạm Bạch Dương |
|  | CAED230220E | Basic of Computer Aided Design (CAD) (2+1) | 3 | 3 | Dr. Phạm Sơn Minh |
|  | MATH141601E | Calculus 1 | 4 | 1 |  |
|  | MATH141701E | Calculus 2 | 4 | 2 |  |
|  | MATH141801E | Calculus 3 | 4 | 3 |  |
|  | PHYS 130402E | Principles of Physics 1 | 3 | 2 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 | 1 |  |
|  | AMME331529E | Applied Mathematics in Mechanical Engineering | 3 | 4 | Dr. Vũ Quang Huy  Dr. Nguyễn Vũ Lân |
|  | PHED110513E | Physical Education 1 | 1 | 1 |  |
|  | PHED110613E | Physical Education 2 | 1 | 2 |  |
|  | PHED130715E | Physical Education 3 | 3 | 3 |  |
|  | GDQP008031E | Military Education | 3 | 1 |  |
|  |  | General Knowledge Option Course | 4 | 4 |  |
| Total *(excluding Physical Education and Military courses)* | | | **41** |  |  |

**7.2 Mechanical Engineering Courses** (76 Credits)

**7.2.1 Fundamental Mechanical Engineering courses**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | EDDG240120E | Descriptive Geometry & Technical Drawing (3+1) | 4 | 2 | MSc. Đỗ Văn Hiến MSc. Trần Minh Thế Uyên |
|  | THME230721E | Mechanics in Engineering | 3 | 2 |  |
|  | STMA230521E | Strength of Materials | 3 | 3 |  |
|  | TMMP230220E | Principles and Parts of Machines | 3 | 4 | Dr. Văn Hữu Thịnh  Dr. Nguyễn Minh Kỳ |
|  | PMMD310423E | Projects on Theory of machine and machine design | 1 | 4 |  |
|  | TOMT220225E | Measuring Techniques & Tolerances | 2 | 3 | Assoc. Prof. Đỗ Thành Trung  MSc. Trần Quốc Hùng |
|  | EXMM210325E | Experiments in Mechanical Measurement | 1 | 3 | MSc. Trần Quốc Hùng  MSc. Đặng Minh Phụng  Assoc. Prof. Đỗ Thành Trung |
|  | MASI230226E | Materials Science | 2 | 2 | Dr. Phạm Thị Hồng Nga  Dr. Nguyễn Thanh Hải |
|  | MATE211126E | Experiments in Materials Science | 1 | 2 | Dr. Phạm Thị Hồng Nga  Dr.Lê Minh Tài |
|  | PNHY330529E | Pneumatic & Hydraulic Technology | 3 | 6 | Assoc. Prof. Nguyễn Trường Thịnh  Assoc. Prof. Nguyễn Ngọc Phương |
|  | EPHT310629E | Experiments in Pneumatic & Hydraulic Technology | 1 | 6 | MSc. Phan Thi Thu Thủy  MSc. Nguyễn Xuân Quang |
|  |  | Foundation Knowledge Option Course | 9 | 4, 5, 6 |  |
| Total | | | **33** |  |  |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | FMMT330825E | Fundamentals of Machine Manufacturing Technology | 3 | 4 | Assoc. Prof. Trương Nguyễn Luân Vũ  Dr. Phạm Huy Tuân |
|  | MTNC340925E | Machines and Numerical Control Systems | 4 | 6 | Assoc. Prof. Lê Hiếu Giang MSc. Trần Quốc Hùng |
|  | MMAT431525E | Machine Manufacturing Technology | 3 | 5 | Assoc. Prof. Lê Hiếu Giang  Assoc. Prof. Trương Nguyễn Luân Vũ |
|  | PMMT411625E | Projects on Machine Manufacturing Technology | 1 | 6 | Assoc. Prof. Trương Nguyễn Luân Vũ  Assoc. Prof. Lê Hiếu Giang Assoc. Prof. Trương Nguyễn Luân Vũ  Assoc. Prof. Lê Hiếu Giang |
|  | EEEI421925E | Electrics and Electronics in Industrial Machines | 2 | 6 | Assoc. Prof. Trương Nguyễn Luân Vũ Assoc. Prof. Đặng Thiện Ngôn |
|  | ELDR312025E | Experiments in Electrics and Electronics in Industrial Machines | 1 | 6 | MSc. Đặng Minh Phụng  MSc. Dương Thế Phong |
|  | CAED321024E | Computer assisted design - CAE | 3 | 5 | Dr. Phạm Sơn Minh  Assoc. Prof. Đỗ Thành Trung |
|  | CCCT431725E | CAD/CAM-CNC | 3 | 5 | Dr. Huỳnh Nguyễn Hoàng Dr. Hoàng Trung Kiên |
|  | AUMP323525E | Automation of Manufacturing Process | 2 | 6 | Assoc. Prof. Trần Ngọc Đãm  Dr. Vũ Quang Huy |
|  | EMPA313625E | Experiments in Automation of Manufacturing Process | 1 | 6 | Dr. Phạm Huy Tuân  MSc. Đinh Nhật Huy |
|  |  | Expertise Knowledge Option Course | 5 | 5 |  |
| Total | | | **28** |  |  |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | PCAD230220E | Practice Basic of Computer Aided Design | 2 | 3 | MSc. Đỗ Văn Hiến MSc. Trần Minh Thế Uyên |
|  | AWEP210426E | Arc Welding Practice | 1 | 3 | MSc. Phan Thanh Tân  MSc. Nguyễn Văn Thức |
|  | GWEP210326E | Oxy-acetylene Welding Practice | 1 | 3 | MSc. Nguyễn Văn Thức  MSc. Phan Thanh Tân |
|  | MHAP120227E | Mechanical Works Practice | 2 | 2 | MSc. Nguyễn Quân Anh |
|  | BATP 230327E | Basic Turning Practice | 3 | 4 | MSc. Nguyễn Văn Minh  MSc. Trương Thành Công |
|  | BAMP220427E | Basic Milling Practice | 2 | 5 | MSc. Trương Thành Công  MSc. Nguyễn Văn Minh |
|  | PCCC421825E | CAD/CAM-CNC Practice | 2 | 5 | MSc. Nguyễn Văn Sơn |
|  | PCNC422124E | CNC Practice | 3 | 6 | MSc. Huỳnh Đỗ Song Toàn |
|  | FAIN423025E | Industry Internship | 2 | 7 |  |
| Total | | | **18** |  |  |

**7.2.3 Graduation thesis (10 Credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | GRAT403125E | Graduation Thesis (Machine Manufacturing Technology) | **10** | 7 or 8 |  |

**B. Optional courses**

**(\*)**Foundation science courses **(4 Credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | GEEC220105E | General Economics | 2 |  |  |
|  | INMA220305E | Introduction to Management | 2 |  |  |
|  | INLO220405E | Introduction to Logics | 2 |  |  |
|  | ULTE121105E | Learning Methods in University | 2 |  |  |
|  | SYTH220505E | Systematic Thinking | 2 |  |  |
|  | PLSK320605E | Planning Skill | 2 |  |  |
|  | IVNC320905E | Introduction to Vietnamese Culture | 2 |  |  |
|  | INSO321005E | Introduction to Sociology | 2 |  |  |

*Notes:* Student selects **2** courses with 4 credits

**(\*) Fundamental Mechanical Engineering Courses (9 Credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | ENVI321223E | Engineering Vibration | 2 | 4, 5, 6 | Dr. Mai Đức Đãi |
|  | CFDY433624E | Computer Fluid Dynamic - CFD | 3 | Dr. Phạm Sơn Minh |
|  | METE330226E | Metal Technology | 3 | Dr. Lê Minh Tài Dr. Nguyễn Thanh Hải |
|  | OPTE322925E | Optimal Engineering | 2 | Assoc. Prof. Đỗ Thành Trung  Dr. Nguyễn Tiến Dũng |
|  | AUCO330329E | Automatic Control | 3 | Assoc. Prof. Trương Nguyễn Luân Vũ  Dr. Vũ Quang Huy |

*Notes:* Student selects **3 - 4** courses with **9** credits

**(\*) Advanced Mechanical Engineering Courses (5 Credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | IMAS330625E | Maintenance in Industry | 2 | 5 | Assoc. Prof. Nguyễn Huy Hoàng |
|  | MOLD431224E | Mold Design and Fabrication | 3 | Dr. Phạm Sơn Minh |
|  | NATE322625E | Nano technology | 2 | Dr. Phạm Huy Tuân |
|  | INRO321129E | Industrial Robots | 2 | Assoc. Prof. Nguyễn Trường Thịnh |

*Notes:* Student selects **2 - 3** courses with 5 credits

**(\*) supplementary courses**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Notes** |
|  | EHQT 130137E | Academic English 1 | (3) |  |
|  | EHQT 230237E | Academic English 2 | (3) |  |
|  | EHQT 230337E | Academic English 3 | (3) |  |
|  | EHQT 230437E | Academic English 4 | (3) |  |
|  | EHQT 330537E | Academic English 5 | (3) |  |
|  | TEEN123725E | Technical English 1 | (2) |  |
|  | TEEN233825E | Technical English 2 | (3) |  |
|  | TEEN333925E | Technical English 3 | (3) |  |
|  | TEEN440725E | Technical English 4 | (3) |  |

**8. Plan of Courses**

**Term 1:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | LLCT150105E | Fundamental Theory of Marxism & Leninism | 5 |  |
|  | INME130125E | Introduction to Engineering Technology | 3 |  |
|  | MATH141601E | Calculus 1 | 4 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 |  |
|  | PHED110513E | Physical Education 1 | 1 |  |
|  | GDQP008031E | Military Education | - |  |
|  | EHQT 130137E | Academic English 1 | (3) |  |
|  | EHQT 230237E | Academic English 2 | (3) |  |
| Total *(excluding Physical Education and Military courses)* | | | **15** |  |

**Term 2:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | | **Prerequisite** |
|  | LLCT120314E | Ho Chi Minh's Ideology | 2 | |  |
|  | MATH141701E | Calculus 2 | 4 | |  |
|  | PHYS 130402E | Principles of Physics 1 | 3 | |  |
|  | PHED110613E | Physical Education 2 | 1 | |  |
|  | EDDG240120E | Descriptive Geometry & Technical Drawing (3+1) | 4 | |  |
|  | THME230721E | Mechanics in Engineering | 3 | |  |
|  | MASI230226E | Materials Science | 2 | |  |
|  | MATE211126E | Experiments in Materials Science | 1 | |  |
|  | MHAP120227E | Mechanical Works Practice | 2 | |  |
|  | EHQT 230337E | Academic English 3 | | (3) |  | |
|  | TEEN123725E | Technical English 1 | | (2) |  | |
| Total *(excluding Physical Education and Military courses)* | | | **21** | |  |

**Term 3:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | | **Prerequisite** | |
|  | LLCT230214E | History of Vietnam Communist Party | 3 | |  | |
|  | CAED230220E | Basic of Computer Aided Design (CAD) (2+1) | 3 | |  | |
|  | MATH141801E | Calculus 3 | 4 | |  | |
|  | PHED130715E | Physical Education 3 | 3 | |  | |
|  | STMA230521E | Strength of Materials | 3 | |  | |
|  | TOMT220225E | Measuring Techniques & Tolerances | 2 | |  | |
|  | EXMM210325E | Experiments in Mechanical Measurement | 1 | |  | |
|  | PCAD230220E | Practice Basic of Computer Aided Design | 2 | |  | |
|  | AWEP210426E | Arc Welding Practice | 1 | |  | |
|  | GWEP210326E | Oxy-acetylene Welding Practice | 1 | |  | |
|  | TEEN233825E | Technical English 2 | | (3) | |  |
| **Total** *(excluding Physical Education and Military courses)* | | | **20** | |  | |

**Term 4:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | AMME331529E | Applied Mathematics in Mechanical Engineering | 3 |  |
|  |  | General Knowledge Option Course 1 | 4 |  |
|  | TMMP230220E | Principles and Parts of Machines | 3 |  |
|  | PMMD310423E | Projects on Theory of machine and machine design | 1 |  |
|  | FMMT330825E | Fundamentals of Machine Manufacturing Technology | 3 |  |
|  |  | Foundation Knowledge Option Course | 3 |  |
|  | BATP 230327E | Basic Turning Practice | 3 |  |
|  | EHQT 230437E | Academic English 4 | (3) |  |
| **Total** | | | **20** |  |

**Term 5:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  |  | Foundation Knowledge Option Course | 3 |  |
|  | MMAT431525E | Machine Manufacturing Technology | 3 |  |
|  | CAED321024E | Computer assisted design - CAE | 3 |  |
|  | CCCT431725E | CAD/CAM-CNC | 3 |  |
|  |  | Expertise Knowledge Option Course | 5 |  |
|  | BAMP220427E | Basic Milling Practice | 2 |  |
|  | PCCC421825E | CAD/CAM-CNC Practice | 2 |  |
|  | TEEN333925E | Technical English 3 | (3) |  |
| **Total** | | | **21** |  |

**Term 6:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | | **Credits** | **Prerequisite** |
|  |  | Foundation Knowledge Option Course | | 3 |  |
|  | PNHY330529E | Pneumatic & Hydraulic Technology | | 3 |  |
|  | EPHT310629E | Experiments in Pneumatic & Hydraulic Technology | | 1 |  |
|  | MTNC340925E | Machines and Numerical Control Systems | | 4 |  |
|  | PMMT411625E | Projects on Machine Manufacturing Technology | | 1 |  |
|  | EEEI421925E | Electrics and Electronics in Industrial Machines | | 2 |  |
|  | ELDR312025E | Experiments in Electrics and Electronics in Industrial Machines | | 1 |  |
|  | AUMP323525E | Automation of Manufacturing Process | | 2 |  |
|  | EMPA313625E | Experiments in Automation of Manufacturing Process | | 1 |  |
|  | PCNC422124E | CNC Practice | | 3 |  |
|  | EHQT330537E | Academic English 5 | (3) | |  |
| **Total** | | | | **21** |  |

**Term 7:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | FAIN423025E | Industry Internship | 2 |  |
|  | TEEN434025E | Technical English 4 | (3) |  |
| **Total** | | | **2** |  |

**Term 8:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
| 1 | GRAT403125E | Thesis(Machine Manufacturing Technology) | 10 |  |
| **Total** | | | **10** |  |

**9. COURSE DESCRIPTION AND WORKLOAD**

**9.1 FOUNDATION SCIENCE COURSES**

1. **Calculus I Credits: 3**

*Distribution of learning time:* ***3 (*3/0/6)**

*Prerequisites: None*

*Former subjects of condition: None*

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

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus -* 6th National Edition–Kendall Hunt.
2. **Calculus II Credit: 3**

*Distribution of learning time:* ***3 (*3/0/6)**

*Prerequisites: None*

*Former subjects of condition:* **Calculus I**

*Course Description*: This course provides the learnerwith contents: Matrix-determinant: the matrix, the form of matrix, inverse matrix, determinants, matrix classes. System of Linear Equations: linear systems, Cramer rule, Gauss method, homogeneous system. Space Vector: Space Vector, subspace, linear independence, linear dependence, basis, dimension, Euclidean space. Diagonal matrix-quadratic form: eigenvalues, eigenvectors, private space, diagonal matrix, quadratic form, canonical form, the surface level 2. Differential calculus of function of several variables: function of several variables, derivative, differential, extreme of function of several variables, calculus applications in geometry in space.

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus -* 6th National Edition–Kendall Hunt.
2. **Calculus III Credit: 3**

* *Distribution of learning time:* ***3 (*3/0/6)**
* *Prerequisites: None*
* *Former subjects of condition:* **Calculus II**
* *Course Description*: This course provides the learner with contents: multiple integral: double integral, application for calculated area of flat domain, calculate the surface area, object volume, triple integrals, and applications for the object volume. Line integral: lineintegral 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 Ostrogratskiformula, vector field, flux and divergence, vector format of Ostrogratski formula, Stokes formula, circulation and vortex vector, vector format of Stokes formula.

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus -* 6th National Edition–Kendall Hunt.
2. **Principles of Physics 1 Credit: 3**

* *Distribution of learning time:* ***3(*2/1/4)**
* *Prerequisites: None*
* *Former subjects of condition: None*
* *Summaries of course:* This course provides the learnerwith 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

1. **General Chemistry for Engineers (GCHE130603) (3 credits)**

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

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

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

**9.2 FUNDAMENTAL MECHANICAL ENGINEERING COURSES**

**1. Descriptive Geometry and Engineering Drawing Credits: 03**

* *Course workload: 3 (3, 0, 6)*
* *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

**2. Theoretical Mechanics Credits: 03**

* *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

**3. Strength of Materials Credits: 04 (3+1)**

* *Course workload: 4 (3, 1, 8)*
* *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.

**4. Theory of machine and machine design Credits: 03**

* *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; 5 edition (March 29, 2013)

**5. Project on Theory of machine and machine design Credits: 01**

* *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; 5 edition (March 29, 2013)

**6. Tolerance and measurement technology Credits: 03 (2+1)**

* *Course workload: 3 (2, 1, 6)*
* *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

**7. Materials Science Credits: 03 (2+1)**

* *Course workload: 3 (2, 1, 6)*
* *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. Computer Aided Design (CAD) Credits: 03 (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. Thermal Engineering Credits: 02**

* *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)

**11. 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, transitor 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**

* *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

**13. Fluid Mechanics Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *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; 7 edition (May 15, 2012)

**14. Engineering Vibration Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:* This course introduces students to dynamics and vibration of mechanical systems, its calculating methods and analysis.
* *Textbook* : Engineering Vibration, Daniel J. Inman, Prentice Hall, Indian International Ed. in Softcover; 4th edition (2013)

**9.3 ADVANCED MECHANICAL ENGINEERING COURSES**

1. **Fundamentals of Machinery Manufacturing Technology Credits: 03**

* *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

1. **Machinery Manufacturing Technology Credits: 03**

* *Course workload: 3 (3, 0, 6)*
* *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*

1. **Project Machinery Manufacturing Technology Credits: 01**

* *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

1. **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.

1. **Mold Design and Fabrication Credits: 03 (2+1)**

* *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)

1. **Production and Quality Management Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*  to provide students with knowledge to be able to organize the production effectively and get involved in product quality management in the enterprise.
* Textbook:

Apparel Production Management and the Technical Package, Paula J. Myers-McDevitt, Fairchild Books (August 23, 2010)

1. **Maintenance in Industry Credits: 03 (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)

1. **Nano technology Credits: 02**

* *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 baic 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)

1. **Industrial Product Design Credits: 03 (2+1)**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*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 using, 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 lowest cost.
* Testing of industrial product design to provide students with knowledge and skills to be able to design a specific industrial products according to the learned methods.
* *Textbook:*

Product Design and Development, 4th Edition, Karl T. Ulrich , Steven D. Eppinger, McGraw-Hill; 4th edition (July 13, 2007)

1. **Energy and Energy Management Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*module aims to provide students with the basic concepts of energy and other forms of energy in human history, the transformation of the form of energy as well as an intimate relationship between environmental issues and energy. Learners are equipped with the basic knowledge about clean energy, renewable energy. The basic principle of the method of creation of new energy sources such as solar, biomass, fuel cells, ... The students are also equipped with knowledge of energy conservation and management that is complied with contemporary state-of-the-art processes.
* *Textbook:*

Energy Management Handbook 8th Edition, Steve Doty , Wayne C. Turner, Fairmont Press; 8 edition (November 7, 2012).

1. **CAD/CAM-CNC Credits: 03 (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
4. **Machines and Numerical Control Systems Credits: 04**

* *Course workload: 4 (4, 0, 8)*
* *Prerequisite:*
* *Course description: provide students with basic knowledge of:*
* General cutting machines, such as lathe, drilling, milling, shaping, planning, grinding machines and their properties according:
  + Basic working principle: types of geometrical shapes of 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 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)

1. **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, 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)

1. **Industrial Robots Credits: 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)

1. **Numerical Methods in Mechanical Engineering Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite:None*
* *Course description:* This course provides knowledge of numerical methods in designing and analyzing mechatronic systems. This course will cover: 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:* Numerical Methods for Scientists and Engineers, R. W. Hamming, Dover Publications; 2nd Revised ed. edition (March 1, 1987)

1. **Optimal Engineering Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite:None*
* *Course description:*This course equips students with knowledge of optimal engineering, including: model and solve engineering optimization problems, methods to solve linear optimization, non-linear optimization, Single – Objective optimization, Multi – Objective optimization…
* *Textbook: Advances in Mathematical Modeling, Optimization and Optimal Control, Jean-Baptiste Hiriart-Urruty , Adam Korytowski , Helmut Maurer , Maciej Szymkat, Springer; 1st ed. 2016 edition (May 20, 2016)*

**9.4 WORKSHOP**

**1. Practice of Metalworking Credits: 02**

* *Course workload: 2 (0, 2, 4)*
* *Prerequisite: None*
* *Course description:* This course provides basic knowledge and skills in metalworking with hand tools and basic equipments such as punchers, chisels, files, drills, measuring equiments;
* *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. Practice of Arc Welding Credits: 01**

* *Course workload: 1 (0, 1, 2)*
* *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; 7 edition (May 12, 2011).

**3. Practice of Turning Credits: 03**

* *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 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

**4. Practice of Milling Credits: 02**

* *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 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, 200

**9. Practice of Manufacturing Process Automation Credits: 01**

* *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

**11. Internship Credits: 02**

* *Course workload: 2 (0, 2, 4)*
* *Prerequisite:*
* *Course description:* The course help students 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

**9.5 GRADUATION PROJECT**

###### Graduation Thesis Credits: 10

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

**10. Campus Infrastructure**

Follow the Ministry of education and training’s regulations

**10.1 Workshops and Laboratories:**

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

**10.2 Library, Website**

* University’s Library
* Faculty’s Library
* Faculty’s Website

**11. PROGRAM GUIDE**

- Credit hour is calculated as:

1 credit = 15 lecture hours

= 30 laboratory hours

= 45 hours practice

= 45 hours self -study

= 90 workshop hours.

= 45 hours for project, thesis.

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

**RECTOR DEAN OF FACULTY**