UNDERGRADUATE PROGRAM

Major of
MECHATRONIC ENGINEERING TECHNOLOGY

November 2016
UNDERGRADUATE PROGRAM

Education Program: MECHATRONIC ENGINEERING TECHNOLOGY
Level: Undergraduate
Major: MECHATRONIC ENGINEERING 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 regualtions of Decision No 43/2007/BGDDT
Graduation Requirements:

General condition: Based on regualtions of Decision No 43/2007/BGDDT
Condition of speciality: None

4. The objectives and Expected Learning Outcomes
Goals
Training human resources, improving intelectual 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 learner 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 Mechatronic Engineering Technology major have basic scientific knowledge, fundamental knowledge, specialised knowledge of mechanical, electricaland 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 specialised/ major knowledge of Mechatronic Engineering Technology.

PO2: Use proficiently self-studying skills major, problem solving skills and professional skills in the major of Mechatronic Engineering Technology.
PO3: Communicate effectively, organize, lead and conduct teamwork.

PO4: Apply well competences of brainstorming, designing, deploying, and operating the Mechatronic systems

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

Program outcomes

A. General knowledge, fundamental and specialised 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 Mechatronic Engineering Technology.
   ELO 3. Create the combination of advanced specialized knowledge in the fields of Mechatronic Engineering Technology.

B. Specialised 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.

C. Communication skills and ability to work in multidiscipline areas:
   ELO 7. Work independently; lead and work in a team.
   ELO 8. Communicate effectively in various methods: written communication, mechanical 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.

D. Skills to take shape of ideas, design, deploying and operate system of Mechatronic Engineering Technology

5. Blocks of knowledge in the whole program: 130 credits (without Physical Education, Military Education, and Supplementary Courses)
6. Allocation of credits

<table>
<thead>
<tr>
<th>Groups of Courses</th>
<th>Credits</th>
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<tr>
<td></td>
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<td>Foundation science courses</td>
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<tr>
<td>- General Politics + Laws</td>
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<tr>
<td>- Social Sciences and Humanities</td>
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<td>- Mathematics and Natural Sciences</td>
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<td>- Technical Computer Sciences</td>
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<td>- Experiments and Practices</td>
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<td>- Internship</td>
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7. CONTENTS OF THE PROGRAM

A. COMPULSORY COURSES

7.1 Foundation science courses (44 credits)

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<td>LLCT230214E</td>
<td>Vietnamese Communist Party Policy of Revolution</td>
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<td>Introduction to Mechanical Engineering</td>
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7.2 Mechatronics Engineering Courses (76 Credits)

7.2.1 Fundamental Mechatronics Engineering courses

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<td>STMA230521E</td>
<td>Strength of Materials</td>
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<td>4</td>
<td>TMMP230220E</td>
<td>Theory of Machine And Machine Design</td>
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<td>5</td>
<td>PMMD310423E</td>
<td>Projects on Theory of machine and machine design</td>
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<td>TOMT220225E</td>
<td>Tolerances And Measuring Technology</td>
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<td>ENMA220130E</td>
<td>Materials Science</td>
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<td>AUO330329E</td>
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<td>FMMT330825E</td>
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7.2.2.a Advanced Mechatronics Engineering courses (Theory and Experiment Courses)

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<td>Digital Techniques</td>
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<td>Microcontrollers</td>
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<td>PCAD315129E</td>
<td>Project of Control and Drive</td>
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<td>CACC320224E</td>
<td>CAD/CAM-CNC</td>
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<td>7</td>
<td>ETDR336429E</td>
<td>Electric Drives</td>
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<td>8</td>
<td>PCTR421929E</td>
<td>Process control</td>
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<td>9</td>
<td>SERV424029E</td>
<td>Drive servo systems</td>
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<td>10</td>
<td>INRO321129E</td>
<td>Industrial Robot</td>
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<td>PRMS415229E</td>
<td>Project of Mechatronic System</td>
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7.2.2.b Advanced Mechatronics Engineering courses (Practice and Internship Courses)

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<td>2</td>
<td>EXMM210325E</td>
<td>Experiments of Mechanical Measurement</td>
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<td>EEEE210229E</td>
<td>Experiments of Electrical and Electronics Engineering</td>
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<td>4</td>
<td>EPHT310629E</td>
<td>Experiments of Pneumatic &amp; Hydraulic Technology</td>
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<td>5</td>
<td>ECCC310324E</td>
<td>Experiments of CAD/CAM-CNC</td>
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<td>EPCT412029E</td>
<td>Experiments of Process Control</td>
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<td>Experiments of Expertise course 1</td>
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<td>9</td>
<td>MATE210230E</td>
<td>Experiments of Materials Science</td>
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<td>10</td>
<td>EWEP210426E</td>
<td>Electric Welding Practice</td>
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<td>11</td>
<td>PMPA316629E</td>
<td>Practice of Manufacturing Process Automation</td>
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<td>12</td>
<td>PMEE331027E</td>
<td>Practice of Mechanical Engineering</td>
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<td>13</td>
<td>PETD316529E</td>
<td>Practice of Electrical Drive</td>
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<td>Practice of Automatic Control</td>
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<td>PAPE311429E</td>
<td>Practice of Applied Programming in Engineering</td>
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<td>16</td>
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<td>Practice of Digital Techniques and Microcontroller</td>
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<td>17</td>
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<td>Practice of Industrial Robots</td>
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<td>Practice of Drive Servo systems</td>
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7.2.3 Graduation thesis (10 Credits)

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<td>GRAT403125E</td>
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B. OPTIONAL COURSES

Foundation science courses (4 Credits)

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<td>General Economics</td>
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<td>INMA220305E</td>
<td>Introduction to Management</td>
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<td>INLO220405E</td>
<td>Introduction to Logics</td>
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<td>4</td>
<td>ULTE121105E</td>
<td>Learning Methods in University</td>
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<td>5</td>
<td>SYTH220505E</td>
<td>Systematic Thinking</td>
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<td>6</td>
<td>PLSK320605E</td>
<td>Planning Skill</td>
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<td>7</td>
<td>IVNC320905E</td>
<td>Introduction to Vietnamese Culture</td>
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<td>8</td>
<td>INSO321005E</td>
<td>Introduction to Sociology</td>
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**Notes:** Student selects 2 courses with 4 credits
Advanced Mechatronics Engineering courses (6 Credits)

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<td>EIIP412629E</td>
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<td>Computer – based Measurement and Control</td>
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<td>AMCO422929E</td>
<td>Advanced Microcontroller and Embedded System</td>
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<td>EAMC413029E</td>
<td>Experiments of Advanced Microcontroller and Embedded System</td>
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**Notes:** Faculty selects 2 expertise courses + 2 experiment courses with 6 credits $2 \times (2+1)$

### C. SUPPLEMENTARY COURSES

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### 8. Plan of Courses

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**Total (excluding Physical Education and Military courses)**: 15
## Term 2:

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<td>Theoretical Mechanics</td>
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<td>DITE226829E</td>
<td>Digital Techniques</td>
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<td>7</td>
<td>FMMT330825E</td>
<td>Fundamentals of Machine Manufacturing Technology</td>
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<td>8</td>
<td>EEEE210229E</td>
<td>Experiments in Electrical and Electronics Engineer</td>
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<td>PAPE311429E</td>
<td>Practice in Applied Programming in Engineering</td>
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<td>Practice in Automation of Manufacturing Process</td>
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<td>PETD316529E</td>
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<td>Advanced Mechatronics Engineering course 1</td>
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**Total 12**

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**Term 8:**

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<td>UGRA4105529E</td>
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**Total 12**
9. COURSE DESCRIPTION AND WORKLOAD

9.1 FOUNDATION SCIENCE COURSES

1. Calculus I

   Course workload: 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:

2. Calculus II

   Course workload: 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. 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:

3. Calculus III

   Course workload: 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, tripleintegrals, 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, vectorformat of Ostrogratski formula, Stokes formula, circulation and vortex vector, vector format of Stokes formula.
   Textbook:

4. Principles of Physics I

   Credit: 3
Course workload: 3(3/0/6)  
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.

Textbook:

5. General Chemistry for Engineers (GCHE130603)  
Credits: 03

Course workload: 3(3/0/6)  
Prerequisites: 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.

Textbook:

6. Introduction to Mechanical Engineering  
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:

7. Applied Programming in Engineering  
Credits: 03

Course workload: 3 (3, 0, 6)  
Prerequisite: None  

Course description: This course provides fundamentals of computer programming and C++ language, basic knowledge and skills for computer programming: define the problem, create algorithm, build program. This course equips students with knowledge and skills so that they can understand, use programming software in building control system software.

Textbook:

8. Applied Mathematics in Mechanical Engineering  
Credits: 3
Course workload: 3 (2, 0, 3)
Prerequisite: None
Former subjects of condition: Calculus I, II
Course description: This course provides basic knowledge of partial differential equation, Laplace transform, numerical methods including approximate solution for differential equation, interpolation, numerical integration, optimization and applications in Mechanical and mechatronics engineering
Textbook:

9. Mathematical Statistics for Engineers  Credits: 03
Distribution of learning time: 3 (3/0/6)
Prerequisites: None
Former subjects of condition: Calculus I
Course Description: This module consist 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:

9.2 FUNDAMENTAL MECHATRONICS ENGINEERING COURSES

1. Descriptive Geometry and Engineering Drawing  Credits: 03
Course workload: 3 (3, 0, 6)
Prerequisite: None
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:

2. Theoretical Mechanics  Credits: 03
Course workload: 3 (3, 0, 6)
Prerequisite: None
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:
3. **Strength of Materials**
   Credits: 04 (3+1)
   
   **Course workload:** 4 (3, 1, 8)
   **Prerequisite:** None
   **Course description:** This course introduces students to fundamental knowledge of strength of materials; methods of calculating the stress, strain in mechanical components, structural members under loading, its load capacity and deformations.
   **Textbook:**

4. **Theory of Machine and Machine Design**
   Credits: 03
   
   **Course workload:** 3 (3, 0, 6)
   **Prerequisite:** None
   **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.
   **Textbook:**
   2. Shigley and Mischke, Mechanical Engineering Design, Tenth Edition

5. **Project on Theory of Machine and Machine Design**
   Credits: 01
   
   **Course workload:** 1 (0, 1, 2)
   **Prerequisite:** None
   **Course description:** This course is help students reinforce the contents of Theory of machine and machine design course: structures, working principles and calculating methods of kinematic, dynamic designs of machine and mechanism, standard mechanical joints and components.
   **Textbook:**
   2. Shigley and Mischke, Mechanical Engineering Design, Tenth Edition

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.

+ **Experiments 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:**

### 7. Materials Science

**Credits:** 03 (2+1)

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

**Prerequisite:** none

**Course description:**
+ 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:**

### 8. Electrical and Electronics Engineering

**Credits:** 3

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

**Prerequisite:** None

**Course description:** This course equips students with knowledge of electrical circuit, circuit design, 1-phase and 3-phase AC circuits. Working principles and calculation methods of current regulator, synchronous motor, asynchronous motor, DC motor. Working principles and calculation methods of basic electrical and electronics components such as diode, transistor BJT, MOSFET, SCR, TRIAC, Opamp.

**Textbook:**

### 9. Automatic Control

**Credits:** 03

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

**Prerequisite:** None

**Course description:** This course provide students with specialized knowledge in Automatic Control such as control theory of continuous systems. This course also provides the knowledges of physical modelling, mathematic approaches to analyze the characteristics of the dynamic systems, and evaluate performance of the control systems and design an automatic control systems.

**Textbook:**
10. **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:**  

9.3 **ADVANCED MECHATRONICS ENGINEERING COURSES**  

1. **Pneumatic - Hydraulic Technology**  
**Credits:** 3  
**Course workload:** 3 (3, 0, 6)  
**Prerequisite:** None  
**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:**  

2. **Manufacturing Process Automation**  
**Credits:** 2  
**Course workload:** 2 (2, 0, 4)  
**Prerequisite:** none  
**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:**  

3. **Digital Techniques**  
**Credits:** 02  
**Course workload:** 2(2, 0, 4)  
**Prerequisite:** none  
**Course description:** This course provides fundamentals of digital system, operating principles, design and structure of digital systems, design and structure of microcontrollers, basic peripheral devices and its applications in a digital system.  
**Textbook:**

4. Microcontroller

**Course workload:** 2 (2, 0, 4)

**Prerequisite:** None

**Course description:** This course provides fundamentals of microcontroller, design and structure of microcontrollers, basic peripheral devices and its applications in a microcontrollersystem.

**Textbook:**

5. Project of Control and Drive

**Course workload:** 1 (1, 0, 2)

**Prerequisite:** None

**Textbook:**

**Course description:** This course helps student reinforce their knowledge of selecting electrical actuators, pneumatics, hydraulics, valves, motors, energy source, calculating the mechanism; and enhances students’s ability to create technical drawing, design electrical system for controlling mechanical system.

6. CAD/CAM-CNC

**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
   Turn/Mill 55 GE Fanuc Series 21

7. Electrical Drive

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

**Prerequisite:** None

**Course description:** This course provides basic knowledge of electrical motors, electrical devices, power electronic components, drives of electrical motor, apply electrical motor in controlling mechatronic system; provides knowledge and skills in classifying DC motor, AC motor, electrical devices; provides fundamentals of motor control, calculate and select motor, power, and suitable devices.

**Textbook:**

8. Process Control

**Course workload:** 2 (2, 0, 4)

**Prerequisite:** None
Course description: This course provides basic knowledge of process control, applications of automatic control and automatic devices in controlling process parameters such as: level, flow rate, pressure, temperature. This course also shows students how to use software to simulate, program and monitor mechatronic systems which related to the process parameters.

Textbook:

9. Drive servosystems
Course workload: 2 (2, 0, 4)
Prerequisite: None
Course description: This course equips students with fundamentals of servo system in industry, topics covered: block diagram, design and control common servo systems, from electrical servo systems with step motor, DC motor, AC motor to hydraulic servo systems. This course also provides knowledge of trajectory generation, especially interpolation algorithm for multi-axis servo systems.

Textbook:

10. Industrial Robot
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.

Textbook:

11. Project of Mechatronic System
Course workload: 1 (1, 0, 2)
Prerequisite: None
Course description: This course helps student reinforce their knowledge of automatic control, manufacturing process automation, selecting mechatronic system control equiments, simulation, implement mechanical systems, control systems to serve the automation of mechatronic systems. This course also helps student to improve their presentation skills.

Textbook:

12. Image Processing In Industry
Course workload: 2 (2, 0, 4)
Prerequisite: None
Course description: This course equips students with fundamentals of image processing, including: noise removal, smoothing, edge detection, color recognition,
segmentation, motion detection. Besides, students will be introduced to the ideas of applying image processing in real situation.

Textbook:

13. Industrial Communication Networks

Course workload: 2 (2, 0, 4)
Prerequisite:
Course description: This course equips students with fundamentals of industrial data transmission. These following topics will be covered: data terminal equipment and communication protocols of common industrial communication network such as: Profibus, Can, DeviceNet, Modbus, Ethernet, AS-i. After the course, students can design a communication network to serve the automation of manufacturing systems in industry.

Textbook:
2. John Park, Steve Mackay, Edwin Wright, Practical Data Communications for instrumentations and control, 2006

14. Computer – Based Measurement and Control

Course workload: 2 (2, 0, 4)
Prerequisite: None
Course description: This course provides basic knowledge of sensor, instruments, PC I/O port, PC Communication, communication protocol, building control and measuring system based on PC.

Textbook:
2. Mikey Tooley, PC Based Instrumentation and Control, 2005

15. Advanced Microcontroller and Embedded System

Course workload: 2 (2, 0, 4)
Prerequisite: None
Course description: This course provides basic knowledge of microcontroller, embedded system, design methods and programming, shows the students how to apply digital system in solving control problems, configure peripheral devices such as: I/O port, ADC, Timer, PWM, UART.

Textbook:

10. Principles of Physics 1 Laboratory

Course workload: 3 (3/0/6)
Prerequisites: None
Former subject of condition: Principles of Physics 1
Course Description: included a module 9 units of kinetic experiments, fluid dynamics and dynamic point solids. This is additional courses apply knowledge about the nature of the physical phenomena occurring in nature, check all physical theories learned in Principles of Physics 1 and also apply observation skills, conduct experiments, measurements and calculations, analysis, data processing for students.

Textbook:

16. Mechanical Experiment

Course workload: 1 (0, 1, 2)
Prerequisite: None
Course description: This course provides learners with contents to verify the theoretical concepts learned in the basic subjects in the fields of mechanical industry applications, such as: The theory, Strength of Materials, Technical oscillator. Besides, the leaners is will be able to identify, measure the volume of typical modern mechanical materials, the typical contemporary kinetic volume, dynamics of solids experimentally.

Textbook:

17. Experiments of Mechanical Measurement

Course workload: 1 (0, 1, 2)
Prerequisite: None
Course description: This course provides students with contents function, operation, and application of common mechanical engineering instruments, measurement principles, and statistical analysis. Major elements of measurement systems, including transduction, signal conditioning, and data recording. Function and operation of digital data acquisition systems.

Textbook:
2. Geometrical Dimensioning and Tolerancing for Design, Manufacturing And Inspection, 2nd edition

18. Experiments of Electrical and Electronics Engineering

Course workload: 1 (0, 1, 2)
Prerequisite: None
Course description: This course equips students with fundamentals of electrical and electronics, including: electronic devices, diode, resistor, capacitor, transistor, triacopamp and investigate the principle of operation and characteristics of these devices.

Textbook:
1. Experiments of Electrical and Electronics Engineering Lab manual, 2016
3. A Textbook of Electrical Technology-Vol 4-Electronic Devices and Circuits - B.L. Theraja et al.

19. Experiments of Pneumatic & Hydraulic Technology

Course workload: 1 (0, 1, 2)
Prerequisite: None

Course description: This course reinforces 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 based on experiments and improve skills of students for building and developing pneumatic and hydraulic systems.

Textbook:

20. Experiments of CAD/CAM-CNC

Course workload: 1 (0, 1, 2)

Prerequisite: None

Course description: This course reinforces basic knowledge learned in CAD/CAM-CNC, and also apply for students basic skills: selection of machining processes order, cutting tool selection and CNC programming, using CAD/CAM software.

Textbook:
2. EMCO WinNC GE Series Fanuc 21 TB
3. EMCO WinNC GE Series Fanuc 21 MB
4. EMCO Win Tutorials - Modular Instructor Guide for Industry and Training-PC Turn/Mill 55 GE Fanuc Series 21

21. Experiments of Process Control

Course workload: 1 (0, 1, 2)

Prerequisite: None

Course description: This course provides basic knowledge and skills in the industrial process control. Applied process control theory, process equipment (including sensors, actuators, control equipment) and specialized software to automate the process parameters: level, flow volume, temperature, pressure in the industry.

Textbook:

22. Experiments of Image Processing in Industry

Course workload: 1 (0, 1, 2)

Prerequisite: None

Course description: This course provides for students of mechatronics engineering technology basic knowledge and skills in image processing, programming for image processing, including the basic handling skills (photo and camera manipulation by the program, blur, noise reduction, highlight edges, color space conversion) and advanced (identification color, contour, detection ...). In addition, students are introduced to the idea of processing real image applications in the factory and life.

Textbook:
23. Experiments of Industrial Communication Networks  
**Credits**: 01  
**Course workload**: 1 (0, 1, 2)  
**Prerequisite**: None  

**Course description**: This course provides for students of mechatronics engineering technology basic knowledge and skills about of industrial data transmission (communication among devices as the computer or PLC in a communications industrial network), How to set up a communications network in the industry, such as Profibus, Can, DeviceNet, Modbus, Ethernet, AS-i ... After finishing, the learner has the ability to design a communications network serving the automation system automated production systems in industry.  
**Text book**:  
1. Experiments of Industrial Communication Networks Lab manual, 2015  

**Credits**: 01  
**Course workload**: 1 (0, 1, 2)  
**Prerequisite**: None  

**Course description**: This course provides for students of mechatronics engineering technology basic knowledge and skills to measure and control the automatic control system based on PC., how to collect and manage data of the system based on sensor system and database system.  
**Text book**:  
1. Jon S. Wilson, Sensor technologies handbook, 2005  
2. Mikey Tooley, PC Based Instrumentation and Control, 2005  

25. Experiments of Advanced Microcontroller and Embedded System  
**Credits**: 01  
**Course workload**: 1 (0, 1, 2)  
**Prerequisite**: None  

**Course description**: This course provides for students of mechatronics engineering technology basic knowledge and skills microcontroller, embedded system, design methods and programming, shows the students how to apply digital system in solving control problems, configure peripheral devices such as: I/O port, ADC, Timer, PWM, UART, internet connection, data acquisition and analyses.  
**Text book**:  
1. None Dogan Ibrahim - PIC Microcontroller Projects in C - Basic to Advanced, 2014  

9.4 **WORKSHOP**

1. **Electric Welding Practice**  
**Credits**: 01  
**Course workload**: 1 (0, 1, 2)  
**Prerequisite**: None  

**Course description**: This course provide students with basic knowledge of electric arc welding such as definition, operating principles of arc welding, welding sticks, operating
principles of TIG, MIG system., the role of welding in the mechanical technology and products of the engineering industry.


2. **Practice of Manufacturing Process Automation**  
   **Course workload:** 1 (0, 1, 2)  
   **Prerequisite:**  
   **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.  
   **Text book:**  
   1. Practice of Manufacturing Process Automation manual 2015  

3. **Practice of Mechanical Engineering**  
   **Course workload:** 3 (0, 3, 6)  
   **Prerequisite:**  
   **Course description:** This course provides basic knowledge and skills in metalworking with hand tools and basic equipments such as punchers, chisels, files, drills, measuring equipments; basic knowledge and skills in turning, grinding and milling  
   **Textbook:**  
   1. Practice of Mechanical Engineering manual, 2015  
   2. Practice of turning manual, 2015  

4. **Practice of Electrical Drive**  
   **Course workload:** 1 (0, 1, 2)  
   **Prerequisite:** None  
   **Course description:** This course provides basic knowledge and skills of  
   - Electrical devices: MCB, Contactor, Relay,  
   - 3-phase motor AC drive, DC drive.  
   - Install inverters, control AC motor using inverter  
   **Textbook:**  
   1. Practice of Electrical Drive Lab manual, 2015  

5. **Practice of Automatic Control**  
   **Course workload:** 1 (0, 1, 2)  
   **Prerequisite:** None  
   **Course description:** This course helps students reinforce their knowledge of Automatic control, shows students how to apply control theory to analyze plant or system, making mathematics model, build and control real automatic control system.  
   **Textbook:**  
   1. Practice of Automatic Control Lab manual, 2016
2. Devendra K. Chatuvedi, Modeling and Simulation of Systems Using MATLAB and Simulink, Taylor Francis, 2010

6. Practice of Applied Programming in Engineering
   
   **Course workload:** 1 (0, 1, 2)
   **Prerequisite:** None
   **Course description:** This course provides fundamentals of computer programming and C++ language, basic knowledge and skills for computer programming: define the problem, create algorithm, build program. This course equips students with knowledge and skills so that they can understand, use programming software in building control system software.
   **Textbook:**

7. Practice of Digital Techniques and Microcontroller
   
   **Course workload:** 1 (0, 1, 2)
   **Prerequisite:** None
   **Course description:** This course provides students with basic knowledge of digital system, elements of digital system, design methods and programming, shows the students how to apply digital system in solving control problems, configure peripheral devices such as: I/O port, ADC, Timer, PWM, UART.
   **Textbook:**

8. Practice of Industrial Robots
   
   **Course workload:** 1 (0, 1, 2)
   **Prerequisite:** None
   **Course description:** This course helps students reinforce their knowledge of robotic: robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid-body dynamics, 3D graphic simulation; control design, actuators, and sensors, robot control and robot programming.
   **Textbook:**
   1. Practice of Industrial Robots Lab manual, 2015

10. Practice of Servo Drive Systems
    
    **Course workload:** 1 (0, 1, 2)
    **Prerequisite:** None
    **Course description:** This course equips students with skills in control industrial servo systems, shows students how to apply control theory, electric drive and power electronic,
equipments in servo control systems.

Textbook:

11. **Industry Internship**  
   **Course workload:** 2 (0, 2, 4)  
   **Prerequisite:** None  
   **Course description:** The course helps 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 mechatronic engineers in professional activities. Train the ability, analysis, synthesis, proposals and solve problems with the soft skills.  
   **Textbook:**  
   1. Student internship manual 2015

9.5 **GRADUATION PROJECT**

Graduation Thesis  
**Course workload:** 10  
**Prerequisite:** Projects on Theory of machine and machine design, project of Mechatronic System, project of Control and Drive  
**Course description:** 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.  
**Textbook:**  
1. Graduation project manual 2015

10. **Campus Infrastructure**

   Follow the Ministry of education and training’s regulations

10.1 **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

10.2 **Library, Website**
- University’s Library
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

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