MINISTRY OF EDUCATION AND TRAINING

**HCM CITY UNIVERSITY OF TECHNOLOGY AND EDUCATION**

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**CURRICULUM**

Programme : **Mechatronic Engineering Technology**

Major: Mechatronic Engineering Technology

Major code: 52510203

Degree: Bachelor

Scheme: Full-time

 *(Promulgate according to Decision No. ..........................., on………… … by rector of HCM city University of Technology and Education)*

**Ho Chi Minh City, 12/2013**

BỘ GIÁO DỤC VÀ ĐÀO TẠO

**TRƯ­ỜNG ……………………………………………………**

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**CHƯ­ƠNG TRÌNH GIÁO DỤC ĐẠI HỌC**

TRÌNH ĐỘ ĐÀO TẠO: **ĐẠI HỌC**

NGÀNH: **CÔNG NGHỆ KỸ THUẬT CƠ KHÍ**

CHƯƠNG TRÌNH: **CÔNG NGHỆ HÀN VÀ GIA CÔNG TẤM**

LOẠI HÌNH ĐÀO TẠO: **CHÍNH QUY**

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| MINISTRY OF EDUCATION AND TRAINING**UNIVERSITY OF TECHNOLOGY AND EDUCATION***⎯⎯⎯⎯⎯⎯⎯⎯* |  |

**CURRICULUM**

Programme : Mechatronic Engineering Technology

Degree: Bachelor

Major: MECHATRONIC ENGINEERING TECHNOLOGY

Major code: 52510203

Scheme: Full-time

 *(Promulgate according to Decision No. ..........................., on………… … by rector of HCM city University of Technology and Education)*

**1. DURATION:** *4 years*

**2. ELIGIBILITY:** graduated from highschool

**3. SCORING SCALE, TRAINING PROCESS, GRADUATION REQUIREMENTS**

* Scoring Scale: *10*
* Training process: *follow the policy #43/2007-MOE&T*
* Graduation requirements:
	+ General requirement**:** *follow the policy #43/2007-MOE&T*
	+ Programme requirement*: No*

**5. COURSE WORKLOAD**

* **150** credits *(not include sport and military course)*

**6. COURSE WORKLOAD**

|  |  |
| --- | --- |
| Course name | Credits |
| Total | Compulsory | Optional |
| **General knowledge** | **57** | **51** | **6** |
| General Politic + Law | 12 | 12 |  |
| Social Sciences and Humanities | 6 |  | 6 |
| English | 9 | 9 |  |
| Mathematics and Natural science | 24 | 24 |  |
| Computer | 3 | 3 |  |
| Introduction to Engineering Technology | 3 (2+1) | 3 (2+1) |  |
| **Advanced knowledge** | **93** | **80** | **13** |
| Foundation | 38 | 32 | 6 |
| Major | 28 | 21 | 7 |
| Experiment, practice | 15 | 15 |  |
| Internship  | 2 | 2 |  |
| Dissertation | 10 | 10 |  |

**7. PROGRAMME CONTENT**

**A. cOMPULSORY cOURSEs**

**7.1 General Knowledge (51 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | LLCT150105 | Theory of Marxism & Leninism | 5 |  |
|  | LLCT230214 | Vietnamese Communist Party History | 3 |  |
|  | LLCT120314 | Ho Chi Minh's Ideology  | 2 |  |
|  | GELA220405 | General Law | 2 |  |
|  | ENGL130137 | English 1 | 3 |  |
|  | ENGL230237 | English 2 | 3 |  |
|  | ENGL330337 | English 3 | 3 |  |
|  | INME130125 | Introduction to Engineering Technology | 3 (2+1) |  |
|  | VBPR131085 | Visual Basic Programming | 3 (2+1) |  |
|  | MATH130101 | Higher Mathematics A1 | 3 |  |
|  | MATH130201 | Higher Mathematics A2 | 3 |  |
|  | MATH130301 | Higher Mathematics A3 | 3 |  |
|  | MATH130401 | Probability & Statistics | 3 |  |
|  | PHYS130102 | Fundamental Physics A1 | 3 |  |
|  | PHYS120202 | Fundamental Physics A2 | 2 |  |
|  | PHYS110302 | Physical Experiment | 1 |  |
|  | GCHE130103 | Fundamental Chemistry A1 | 3 |  |
|  | MATH131501 | Mathematic in Teaching Engineering | 3 |  |
|  | PHED110513 | Physical Education 1 | 1 |  |
|  | PHED110613 | Physical Education 2 | 1 |  |
|  | PHED130715 | Physical Education 3 (Elective) | 3 |  |
|  | GDQP008031 | Military Formation 1 (Theory) | 1 |  |
|  | GDQP008032 | Military Formation 2 (Theory) | 1 |  |
|  | GDQP008033 | Military Formation 3 (Theory) | 2 |  |
| Total *(not include sport and military course)* | **51** |  |

**7.2 Professional knowledge (93 credits)**

**7.2.1 Foundational knowledge**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | EDDG230120 | Descriptive Geometry & Technical Drawing | 3 |  |
|  | THME230721 | Mechanics in Engineering | 3 |  |
|  | STMA230521 | Strength of Materials | 3 |  |
|  | METE210321 | Experiments on Mechanics | 1 |  |
|  | TMMP230220 | Principles & Parts of Machines | 3 |  |
|  | PMMD310423 | Project on Theory of machine and machine design | 1 |  |
|  | TOMT220225 |  Measuring Techniques & Tolerances | 2 |  |
|  | EXMM210325 | Experiments on Mechanical Measurement | 1 |  |
|  | ENMA220126 | Material Science 1 | 2 |  |
|  | MATE211126 | Experiments on Material Science | 1 |  |
|  | ENME320124 | English in Engineering | 2 |  |
|  | FMMT330825 | Fundamentals of Machinary Manufacturing Technology | 3 |  |
|  | AUCO330329 | Automatic Controls | 3 |  |
|  | EEEN230129 | Electrical and Electronics Engineering | 3 |  |
|  | EEEE210229 | Experiment of Electronic electrical engineering | 1 |  |
| Total | **32** |  |

**7.2.2.a Major knowledge** *(for lecture and experiment)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | PNHY330529 | Pneumatic & Hydraulic Systems | 3 |  |
|  | MPAU320729 | PLC Programming Techniques | 2 |  |
|  | DTMC240929 | Digital Techniques and Microcontroller | 4 |  |
|  | INRO321129 | Industrial Robots | 2 |  |
|  | APEN331329 | Applied Programming with C++ | 3 |  |
|  | PCAD315129 | Control and Drive Project | 1 |  |
|  | EPHT310629 | Experiments on Pneumatic Drive & Hydraulic Drive | 1 |  |
|  | ETDR336429 | Electric drives | 3 |  |
|  | SERV424029 | Drive servo systems | 2 |  |
| Total | **21** |  |

**7.2.2.b Major knowledge** *(for practice and intership)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | EWEP210426 | Electric Welding Practice | 1 |  |
|  | PMPA316629 | Practice in PLC Programming | 1 |  |
|  | MHAP120227 | Mechanical Works Practice  | 2 |  |
|  | BATP230227 | Basic Turning Practice | 3 |  |
|  | BAMP220327 | Basic Milling Practice | 2 |  |
|  | PETD316529 | Practice of Electrical Drive | 1 |  |
|  | PAUC410429 | Experiment of Automatic Control | 1 |  |
|  | PAPE311429 | Practice in Applied Programming with C++ | 1 |  |
|  | PDTM311029 | Practice of Digital Techniques and Microcontroller | 1 |  |
|  | PINR411229 | Experiments on Industrial Robots | 1 |  |
|  | PSER414129 | Practice of Drive servo systems | 1 |  |
|  | FAIN423029 | Factory Internship | 2 |  |
| Total | **17** |  |

**7.2.3 Dissertation / Exit exam (10 credit)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | UGRA405529 | Dissertation (Mechatronics) | **10** |  |
|  |  | Exit exam | **10** |  |
|  | STOG445629 | - Special subject graduate 1 | 4 |  |
|  | STOG435729 | - Special subject graduate 2 | 3 |  |
|  | STOG435829 | - Special subject graduate 3 | 3 |  |

*Notes:* Student selects 1 direction

**B. Optional courses**

**General knowledge (6 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | GEEC220105 | General Economic | 2 |  |
|  | INMA220305 | Introduction of Management | 2 |  |
|  | INLO220405 | Introduction to Logic | 2 |  |
|  | ULTE121105 | University Learning methods  | 2 |  |
|  | SYTH220505 | Systems Thinking | 2 |  |
|  | PLSK320605 | Planning Skills | 2 |  |
|  | IVNC320905 | Fundamental of Viet Nam culture | 2 |  |
|  | INSO321005 | Introduction to Sociology | 2 |  |

*Notes:* Student selects 3 courses, 6 credits

**Foundational and Major knowledge (6 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | CADM230320 | Computer Graphic Techniques | 3 (2+1) |  |
|  | ENVI320921 | Engineering/Mechanical Vibrations | 2 |  |
|  | FLUI220132 | Fluid Mechanics (FME) | 2 |  |
|  | THER222932 | Thermal Engineering | 2 |  |
|  | CACC320224 | Basic CAD/CAM/CNC Technology | 2 |  |
|  | ECCC310324 | Experiments on Basic CAD/CAM/CNC Technology | 1 |  |

*Notes:* Student selects 3-4 courses, cumulates at least 6 credits

**Core knowledge** *(for lecture and experiment)*

* **MECHATRONIC SYSTEMS DIRECTION (7 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | INCN421629 | Industrial Communication Networks | 2 |  |
|  | EICN411729 | Experiment of Industrial Communication Networks | 1 |  |
|  | PCTR421929 | Process control  | 2 |  |
|  | EPCT412029 | Experiment of Process Control | 1 |  |
|  | IIPR422529 | Image processing in industry | 2 |  |
|  | EIIP412629 | Experiment of Image processing | 1 |  |
|  | CBMC423629 | Computer – based Measurement and Control | 2 |  |
|  | ECMC413729 | Experiment of Computer – based Measurement and Control | 1 |  |
|  | PRMS415229 | Project of Mechatronic systems | 1 |  |

* *Notes:* - Student selects 4-5 courses, cumulate at least 7 credits.

 - If student selects an experiment course, they are required to choose its lecture course also.

* **MECHATRONIC PRODUCTS DIRECTION (7 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | IIPR422529 | Image processing in industry | 2 |  |
|  | EIIP412629 | Experiment of Image processing | 1 |  |
|  | ERMA321025 | Energy Source and Energy management | 2 |  |
|  | PDAD432229 | Product Design and Development | 3 |  |
|  | CBMC423629 | Computer – based Measurement and Control | 2 |  |
|  | ECMC413729 | Experiment of Computer – based Measurement and Control | 1 |  |
|  | AMCO422929  | Advanced Microcontroller | 2 |  |
|  | EAMC413029 | Experiment of Advanced Microcontroller | 1 |  |
|  | PRMP415329 | Project of Mechatronic products | 1 |  |

* *Notes*: - Student selects 4-5 course, cumulate at least 7 credits.

 - If student selects an experiment course, they are required to choose its lecture course also.

* **SIMULATION, CALCULATE MECHATRONIC SYSTEMS DIRECTION (7 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | MSMS424629 | Mechatronic-system modeling and simulation | 2 |  |
|  | EMMS414729 | Practice ofMechatronic-system modeling and simulation | 1 |  |
|  | OPTE322925  | Practice ofOptimization in Teachinal Engineering | 2 |  |
|  | EOPE416029 | Optimization in Teachinal Engineering | 1 |  |
|  | NCME322725 | Numerical Methods in Mechanical Engineering | 2 |  |
|  | ENMM416129 | Experiment of Numerical Methods in Mechanical Engineering | 1 |  |
|  | CBMC423629 | Computer – based Measurement and Control | 2 |  |
|  | ECMC413729 | Experiment of Computer – based Measurement and Control | 1 |  |
|  | PMDS416229 | Project of Mechatronic-system modeling and simulation | 1 |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Notes |
|  | MSMS424629 | Mechatronic-system modeling and simulation | 2 |  |
|  | EMMS414729 | Practice ofMechatronic-system modeling and simulation | 1 |  |
|  | OPTE322925  | Practice ofOptimization in Teachinal Engineering | 2 |  |
|  | EOPE416029 | Optimization in Teachinal Engineering | 1 |  |
|  | NCME322725 | Numerical Methods in Mechanical Engineering | 2 |  |
|  | ENMM416129 | Experiment of Numerical Methods in Mechanical Engineering | 1 |  |
|  | CBMC423629 | Computer – based Measurement and Control | 2 |  |
|  | ECMC413729 | Experiment of Computer – based Measurement and Control | 1 |  |
|  | PMDS416229 | Project of Mechatronic-system modeling and simulation | 1 |  |

*Notes*: - Student selects 4-5 course, cumulate at least 7 credits.

 - If student selects an experiment course, they are required to choose its lecture course also.

**8. Lesson plan**

**Term 1:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  | MATH130101 | Mathematic 1 | 3 |  |
|  | MATH130201 | Mathematic2 | 3 |  |
|  | ENGL130137 | English 1 | 3 |  |
|  | GCHE130103 | General Chemistry A1 | 3 |  |
|  | INME130125 | Introduction to Engineering Technology | 3(2+1) |  |
|  | VBPR131085 | Visual Basic Programming | 3(2+1) |  |
|  | GELA220405 | General Law | 2 |  |
|  | PHYS130102 | Physic 1 | 3 |  |
|  | PHED110513 | Physical Education 1 | 1 | S/U |
| Total | **23** |  |

**Term 2:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  | MATH130301 | Mathematic 3 | 3 |  |
|  | MATH130401 | Mathematic of Statistic | 3 |  |
|  | LLCT150105 | Theory of Marxism & Leninism | 5 |  |
|  | ENGL230237 | English 2 | 3 |  |
|  | PHYS120202 | Physic 2  | 2 |  |
|  | MATH131501 | Mathematic in Teaching Engineering | 3 |  |
|  | MHAP120227 | Mechanical Works Practice  | 2 |  |
|  |  | Social Sciences and Humanities 1  | 2 |  |
|  | PHED110613 | Physical Education 2 | 1 | S/U |
| Total | **23** |  |

**Term 3:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  | LLCT120314 | Ho Chi Minh's Ideology  | 2 |  |
|  | PHYS110302 | Experiment of Physic | 1 |  |
|  | ENGL330337 | English 3 | 3 |  |
|  | THME230721 | Theory of Mechanics | 3 |  |
|  | EEEN230129 | Electronic electrical engineering | 3 |  |
|  | EDDG230120 | Descriptive Geometry& Technical Drawing | 3 |  |
|  | TOMT220225  |  Measuring Techniques & Tolerances | 2 |  |
|  | EXMM210325 | Experiment of Measuring Mechanic | 1 |  |
|  |  | Social Sciences and Humanities 2  | 2 |  |
|  |  | Social Sciences and Humanities 3  | 2 |  |
|  | PHED130715 | Physical Education 3 (Elective) | 3 |  |
| Total | **22** |  |

**Term 4:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  | LLCT230214 | Vietnamese Communist Party History | 3 |  |
|  | TMMP230220 | Principles & Parts of Machines | 3 |  |
|  | STMA230521 | Strength of materials | 3 |  |
|  | DTMC240929 | Digital Techniques and Micro-Controller | 4 |  |
|  | ENMA220126 | Material Science 1 | 2 |  |
|  |  | Foundational Courses 1 | 3 |  |
|  | ETDR336429 | Electric drives | 3 |  |
|  | EEEE210229 | Experiment of Electronic electrical engineering | 1 |  |
|  | EWEP210426 | Electric Welding Practice | 1 |  |
| Total | **23** |  |

**Term 5:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  | FMMT330825 | Fundamentals of Machinary Manufacturing Technology | 3 |  |
|  | MPAU320729 | Manufacturing Process Automation | 2 |  |
|  | PNHY330529 | Pneumatic –Hydraulic Technology | 3 |  |
|  | APEN331329 | Applied Programming in Engineering | 3 |  |
|  | METE210321 | Experiments on Mechanics | 1 |  |
|  | MATE211126 | Experiments on Material Science | 1 |  |
|  | PMMD310423 | Project on Theory of machine and machine design | 1 |  |
|  | PDTM311029 | Practice of Digital Techniques and Micro-Controller | 1 |  |
|  | PETD316529 | Practice of Electric drives | 1 |  |
|  | PAPE311429 | Practice of Applied Programming in Engineering | 1 |  |
|  | BAMP220327 | Basic Milling Practice | 2 |  |
| Total | **19** |  |

**Term 6:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  |  | Foundational Courses 2 | 3 |  |
|  | AUCO330329 | Automatic Control  | 3 |  |
|  | INRO321129 | Industrial Robots | 2 |  |
|  | ENME320124 | English Mechanical Engineering | 2 |  |
|  | PCAD315129 |  Project of Control and Drive | 1 |  |
|  | EPHT310629 | Practice of Pneumatic –Hydraulic Technology | 1 |  |
|  | BATP230227 | Basic Turning Practice | 3 |  |
|  | PMPA316629 | Practice of Manufacturing Process Automation | 1 |  |
| Total | **16** |  |

**Term 7:**

* MECHATRONIC SYSTEMS TREND

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  |  | Major Courses (Mechatronic systems direction) | 7 |  |
|  | PINR411229 | Practice of Industrial Robots | 1 |  |
|  | PAUC410429 | Practice of Automatic Control | 1 |  |
|  | SERV424029 | Drive servo systems | 2 |  |
|  | PSER414129 | Practice of Drive servo systems | 1 |  |
| Total | **12** |  |

* MECHATRONIC PRODUCTS TREND

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  |  | Major Courses (Mechatronic products direction) | 7 |  |
|  | PINR411229 | Practice of Industrial Robots | 1 |  |
|  | PAUC410429 | Practice of Automatic Control | 1 |  |
|  | SERV424029 | Drive servo systems | 2 |  |
|  | PSER414129 | Practice of Drive servo systems | 1 |  |
| Total | **12** |  |

* SIMULATION CALCULATION OF MECHATRONIC SYSTEMS TREND

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
|  |  | Major Courses (Simulation direction) | 7 |  |
|  | PINR411229 | Practice of Industrial Robots | 1 |  |
|  | PAUC410429 | Practice of Automatic Control | 1 |  |
|  | SERV424029 | Drive servo systems | 2 |  |
|  | PSER414129 | Practice of Drive servo systems | 1 |  |
| Total | **12** |  |

**Term 8:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Course Code | Course Name | Credits | Prerequisite |
| 1 | FAIN425429 | Factory Internship | 2 |  |
| 2 | UGRA405529 | Undergraduate Thesis (CĐT) | 10 |  |
|  |  | Exit Examination |  |  |
| 3 | STOG445629 | - Special subject graduate 1 | 4 |  |
| 4 | STOG435729 | - Special subject graduate 2 | 3 |  |
| 5 | STOG435829 | - Special subject graduate 3 | 3 |  |
| Total | **12** |  |

**9. COURSE DESCRIPTION AND WORKLOAD**

**9.1 GENERAL EDUCATION COURSES**

**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.

**9.2 FOUNDATIONAL 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.

**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.

**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.

**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,

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

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

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

* *Course workload: 3 (2, 1, 6)*
* *Prerequisite:*
* *Course description:* This course provides a foundation for
* Tolerance and assembly of basic mechanical joints such as cylindrical joint, keyed joint, threaded joint, calculating methods for assembly dimension chain, drawing standards, measuring methods and instruments.

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

* *Course workload: 3 (2, 1, 6)*
* *Prerequisite:*
* *Course description:* the subject provides:
* 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…

**8. English for Mechanical Engineering Credits: 2**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite:*
* *Course description:* this course equips students with technical term and phrase so that the students can develop the ability to read and comprehend English textbook, journal; improve technical reading, writing and presentation skills. This course also helps students improve their communication, confidence so that they can work in international environment.

**9. Computer Aided Design (CAD) Credits: 03 (2+1)**

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

**10. Thermal Engineering Credits: 02**

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

**11. Electrical and Electronics Engineering Credits: 3**

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

**12. Electrical and Electronics Engineering Laboratory Credits: 1**

* *Course workload:* 1*(0:1:2)*
* *Prerequisite:*
* *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.

**13. Fluid Mechanics Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite:*
* *Course description:*  This course provides fundamental knowledge of fluid statics, kinematics and dynamics, analysis of ideal fluid motion and its practical application.

**14. Engineering Vibration Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite:*
* *Course description:* This course introduces students to dynamics and vibration of mechanical systems, its calculating methods and analysis.

**15. CAD/CAM - CNC Credits: 03 (2+1)**

* *Course workload: 3 (2, 1, 6)*
* *Prerequisite:*
* *Course description:* This course provides knowledge and operating principles of CAD/CAM, visualization, computer graphics, computer aid design, CNC programming, automated manufacturing.

**16. Automatic Control Credits: 3**

* *Course workload: 3(3:0:6)*
* *Prerequisite:*
* *Course description:* This course equips students with fundamentals of automatic control theory, continuous-time and discrete-time linear system, helps students develop the ability to build mathematical models of physical systems, ability to apply mathematical tools to observe the kinematics of a system, design and adjust a control system. This is a foundational course, providing students foundations to quickly approach practical, advanced applications in automated manufacturing

**9.3 MAJOR COURSES**

**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.

**2. Pneumatic - Hydraulic Technology Laboratory Credits: 1**

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

**3. 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.

**4. Digital Techniques and Microcontroller Credits: 04**

* *Course workload: 4 (4, 0, 8)*
* *Prerequisite:*
* 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.

#### 5. Industrial Robots Credits: 2

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

**6. 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.

**7. Industrial Communication Networks Credits: 2**

* *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 equiment 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 sytems in inductry.

**8. Experiment of Industrial Communication Networks Credits: 01**

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

**9. Process Control Credits: 02**

* *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.

**10. Experiment of Process Control Credits: 01**

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

**11. Image Processing In Industry Credits: 02**

* *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.

**12. Experiment of Image Processing in Industry Credits: 01**

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

**13. Servo Drive Systems Credits: 02**

* *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.

**14. Product Design and Development Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*This is a project-based course that provides knowledge, methods and tools for product design and development to create a useful product. During the project, students conceive, design and prototype a physical product. This project helps student reinforce the knowledge of product design, indentifying customer needs, and develop soft skills like team work, presentation, planning, communication, data processing.

**15. Computer – Based Measurement and Control Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*This course provides knowledge and tools for designing and implementing computer-based measurement and control to monitor and control physical parameters.

**16. Experiment of Computer – Based Measurement and Control Credits: 01**

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

**17. Advanced Microcontroller Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:*This course equips students with basic knowledge of the architecture of ARM Cortex M3 microcontroller, hardware design, peripheral devices, compilers and practical applications of ARM microcontroller.

**18. Experiment of Advanced Microcontroller Credits: 01**

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

**19. Electrical Drive Credits: 3**

* *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.

**20. Mechatronic-System Model and Simulation Credits: 02**

* *Course workload: 2 (2, 0, 4)*
* *Prerequisite: None*
* *Course description:* This course provides fundamentals of modeling and simulation in designing mechatronic system. Topics covered: modeling, analysis and simulation of a multi-joint mechanism, simulation of an automatic control system. This course provides foundation for students to understand and apply simulation software in designing, manufacturing a mechatronic product.

**21. Experiment of Mechatronic-System Model and Simulation Credits: 01**

**22. Optimal Engineering Credits: 02**

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

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

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

**24. Control and Drive Project Credits: 01**

* *Course workload: 1 (1, 0, 2)*
* *Prerequisite: None*
* *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 ability to create technical drawing, design electrical system for controlling mechanical system.

**25. Mechatronic System Project Credits: 01**

* *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.

**26. Mechatronic Products Project Credits: 01**

* *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.

**27. Mechatronic-System Design and Simulation Project Credits: 01**

**9.4 WORKSHOP**

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

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

**2. Practice of Arc Welding Credits: 01**

* *Course workload: 1 (0, 1, 2)*
* *Prerequisite:*
* *Course description:* This course introduces students to the definition, operating principles of arc welding, welding sticks, operating principles of TIG, MIG system

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**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.

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

* *Course workload: 2 (0, 2, 4)*
* *Prerequisite:*
* *Course description:* This course provides basic knowledge and skills in milling.

**5. Practice of Digital Techniques and Microcontroller Credits: 01**

* *Course workload: 1 (0, 1, 2)*
* *Prerequisite: None*
* *Course description:* This course provides 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…

#### 6. Practice of Industrial Robots Credits: 01

* *Course workload: 1 (0, 1, 2)*
* *Prerequisite: None*
* *Course description:* This course provides basic knowledge of industrial robot, kniematic, dynamic of robot, robot control and robot programming.

**7. Practice of Applied Programming in Engineering Credits: 01**

* *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.

**8. Practice of Electrical Drive Credits: 01**

* *Course workload: 1 (0, 1, 2)*
* *Prerequisite: None*
* *Course description:*This course provides basic knoeledge of
* Electrical devices: MCB, Contractor, Relay, …
* 3-phase motor AC drive
* Install inverters

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

* *Course workload: 1 (0, 1, 2)*
* *Môn học tiên quyết: 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.

**10. Practice of Servo Drive Systems Credits: 01**

* *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, equipments in servo systems.

**11. Internship Credits: 02**

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

**9.5 GRADUATION PROJECT**

###### Dissertation 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
* Microcontroller Laboratory
* Sensory Laboratory
* PLC Laboratory
* Electrical Drive Laboratory
* Pneumatic - Hydraulic Laboratory
* Automated Manufacturing Laboratory
* Process Control Laboratory
* Robotics Laboratory
* Image processing and Multimedia Laboratory

**10.2 Library, Website**

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

**11. PROGRAMME GUIDE**

Credit hour is calculated as:

 1 credit = 15 lecture hours

 = 30 laboratory hours

= 45 hours pratice

 = 45 hours self -study

 = 90 workshop hours.

 = 45 hours for project, dissertation.

Credit hour is multiples of 15.

* Exit examination: exam general knowledge, foundational and major knowledge.
* Dissertation: conduct a research project to solve specific technical problems related to the major.
* Curriculum must ascertain the logic of the learning process. The faculty need to determine prerequisite courses and advanced courses in the curriculum.

 **RETOR DEAN OF FACULTY**