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| **MINISTRY OF EDUCATION AND TRAINING**  **UNIVERSITY OF TRANSPORT AND COMMUNICATIONS**  **FACULTY OF MECHANICAL ENGINEERING**  **PROGRAMME SPECIFICATIONS**  **MECHANICAL ENGINEERING**  **CODE: 7520103**  **HANOI, 2020** |

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| **MINISTRY OF EDUCATION AND TRAINING** | **SOCIALIST REPUBLIC OF VIETNAM**  **Independence – Freedom – Happiness** |
| UNIVERSITY OF TRANSPORT AND COMMUNICATIONS  No. |  |

*Hanoi, DD/MM/2020*

**PROGRAMME SPECIFICATION**

**Major:** Mechanical Engineering

**Major code:** 7520103

**Education level:** Full-time undergraduate

**Training period:** 4.5 years

**Training institution:** University of Transport and Communications

**Training Unit:** Faculty of Mechanical Engineering

**Information about accreditation certificates**: University of Transport and Communications has accredited in 2017

**Title of the degree**: Engineer

## i. Programme objectives

### 1.1. General objectives

a) Training human resources, improving people's knowledge, fostering talents; researching science and technology to create new knowledge and products, serving the requirements of socio-economic development, and ensuring national defense, security, and international integration.

b) Training learners with political and moral qualities; Have solid basic and professional knowledge, professional practice skills, research capacity, and creative ability to solve problems related to design, calculation, manufacturing, and assembling equipment in mechanical engineering; ability to use modeling and simulation tools, optimizing system structure and function in designing and manufacturing equipment in production systems and means of transportation. Meet the requirements for highly qualified labor in mechanical engineering for the country, region, and the world...

### 1.2. Specific objectives

* PO1. Have knowledge of mathematics and natural sciences to meet the requirements for acquiring professional educational knowledge and the ability to study at a higher level.
* PO2. Have knowledge of mechanical engineering and skills to solve problems in the field of mechanical engineering.
* PO3. Able to work effectively in teamwork, to read and understand specialized documents, and communicate in English or other foreign languages; Have awareness and ability for lifelong learning.
* PO4. Have an understanding of basic knowledge in the social sciences and humanities appropriate to the educated major; Have good health and meet the requirements of building and protecting the country.

## ii. LEARNING OUTCOMES OF Mechanical Engineering

### 2. 1. Name of training major: Mechanical Engineering

### 2. 2. Education level: Undergraduate (Degree: Engineer)

### 2. 3. Learning outcomes (ELOs)

|  |  |  |  |
| --- | --- | --- | --- |
| **ELOs** | **Alignment with PO** | **Bloom level** | **General/ Specialized knowledge** |
| ELO1. Have knowledge of the basic principles of Marxism-Leninism, Ho Chi Minh’s Thought, understand the basic content of the revolutionary struggle line, theoretical and practical lessons of the Communist Party of Vietnam to have the right awareness and action in life, in study and occupational labor. | PO4 | 3 | General |
| ELO2.  Have knowledge of security and defense issues and have a sense of appropriate action and a good health to national construction and defense. | PO4 | 3 | General |
| ELO3. Have basic knowledge of mathematics, natural sciences and basic engineering suitable for the field of mechanical engineering. | PO1 | 4 | Specialized |
| ELO4. Have specialized knowledge in the field of mechanical engineering, specifically: calculating, designing, manufacturing, assembling, operating, exploiting, technical maintenance of mechanical systems, ... | PO2 | 5 | Specialized |
| ELO5. Meet basic information technology skills, be able to use software applying in the field of mechanical engineering (eg: calculation, design, simulation software... in the field of mechanical engineering. | PO2 | 3 | Specialized |
| ELO6. Have skills in analyzing, identifying, and defining the technical requirements of an object in the field of mechanical engineering. Consequently, be able to design, plan, deploy, and evaluate an object, a system, or a process, in the field of mechanical engineering. | PO2 | 4 | Specialized |
| ELO7. Ability to design and conduct experiments. Analyze and explain the data and results related to the mechanical engineering. | PO2 | 4 | Specialized |
| ELO 8. Ability to formulate ideas, design, implement ideas in the field of mechanical engineering. Ability to operate and use machines, equipment and mechanical systems. | PO2 | 4 | Specialized |
| ELO9. Have effective communication skills through reports and presentations. Have foreign language proficiency equivalent at level 3 in the 6-level foreign language proficiency framework issued by the Ministry of Education and Training. | PO3 | 3 | General |
| ELO10. Have effective teamwork skills to accomplish general goals | PO3 | 4 | General |
| ELO11. Have a sense of civic responsibility, have the right professional attitude and ethics, have a sense of discipline and industrial manners. | PO4 | 3 | General |
| ELO12. Ability to self-acquire professional knowledge and lifelong learning | PO4 | 3 | General |

### 2.4. References of programs, textbooks and international standards

- Undergraduate training programs of the global prestigious universities in the field of transport in general and Mechanical Engineering in particular such as Hanoi University of Science and Technology, University of Science and Technology - Ho Chi Minh City National University**,** Hanoi University of Industry or Faculty of Mechanical Engineering, University of Michigan (USA), Nagoya University (Japan). The courses have the same content and duration, so it is convenient for the UTC to sign cooperation documents with universities around the world on student exchange, as well as the equivalent conversion of some credits for students or dual degree programs,.

- Standard textbooks in the Mechanical Engineering major have been widely used in universities of the US, Canada, Australia, France, China, Russia, etc.

## iii. PERIOD OF TRAINING

Total training period is 4.5 years.

## iv. VOLUME OF KNOWLEDGE in ENTIRE COURSE

155 credits

## v. ELIGIBILITY

Students must meet standards as specified by the Minsitry of Education and Training.

## vi. TRAINING PROCESS, GRADE AND GRADUATION CONDITIONS

- Training process: Under the credit system

- Grade and graduation conditions: Under the Decision No. 43/2007/QD-BGDDT dated August 15, 2007 of the Minister of Education and Training promulgating Regulations on undergraduate training under the credit system.

## vii. CONTENT OF PROGRAM

1. **General information(credit unit)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Order** | **Knowledge Group** | **Required credits** | **Elective credits** | **Total credits** | **%** |
| 1 | General knowledge | 42 | 0 | 42 | 27.10 |
| 2 | Foundational knowledge | 46 | 03 | 49 | 31.61 |
| 3 | Specialized knowledge | 47 | 17 | 64 | 41.29 |
| **Total** | | **135** | **20** | **155** | **100%** |

1. **Curriculum**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NO** | **COURSE NAME** | **COURSE ID** | **CREDITS** | **CLASS SESSION** | | **Course design** | **Project** | **PRACTICE** | | **SELF LEARNING** | **Pre-requi-site course** |
|
| **Theory** | **Discussion + Exercise** | **Experiment** | **Practice** |
|  | **SEMESTER 1** |  |  |  |  |  |  |  |  |  |  |
| 1 | National defence and security education 1 | GQP201.3 | 3 | 45 |  |  |  |  |  | 90 |  |
| 2 | National defence and security education 2 | GQP202.2 | 2 | 30 |  |  |  |  |  | 60 | 1 |
| 3 | National defence and security education 3 | GQP203.3 | 3 | 45 |  |  |  |  | 30 | 90 |  |
| 4 | Basic informatics | CPM03.2 | 2 | 15 | 15 |  |  |  | 15 | 60 |  |
| 5 | Linear algebra | DSO01.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| 6 | Calculus 1 | GIT01.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 7 | Physical Education F1 | GDT01.1 | 1 | 12 |  |  |  |  | 18 | 30 |  |
|  | **Total** |  | **16** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 2** |  |  |  |  |  |  |  |  |  |  |
| 8 | Marxist-Leninist philosophy F1 | MLN01.2 | 2 | 21 | 18 |  |  |  |  | 60 |  |
| 9 | Calculus 2 | GIT02.3 | 3 | 30 | 30 |  |  |  |  | 90 | 6 |
| 10 | Theoretical mechanics | CLT201.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 11 | Chemistry | HOA04.2 | 2 | 15 |  |  |  | 30 |  | 60 |  |
| 12 | Physics | VLY201.4 | 4 | 45 | 15 |  |  | 15 |  | 120 |  |
| 13 | Engineering drawing F1 | VKT301.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 14 | Physical education F2 | GDT02.1 | 1 |  |  |  |  |  | 30 | 30 | 7 |
|  | **Total** |  | **18** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 3** |  |  |  |  |  |  |  |  |  |  |
| 15 | Marxist-Leninist philosophy F2 | MLN02.3 | 3 | 32 | 26 |  |  |  |  | 90 | 8 |
| 16 | Heat engineering | KTN01.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 17 | Engineering drawing F2 | VKT03.3 | 3 | 30 | 30 |  | 10 |  |  | 90 | 13 |
| 18 | Electrical engineering | KTD01.3 | 3 | 30 | 15 |  |  | 15 |  | 90 |  |
| 19 | Mechanical materials science | CNG201.3 | 3 | 30 | 15 |  |  | 15 |  | 90 |  |
| 20 | Theory of machines | KTM01.3 | 3 | 30 | 30 |  | 10 |  |  | 90 |  |
| 21 | Physical education F3 | GDT03.1 | 1 |  |  |  |  |  | 30 | 30 | 14 |
|  | **Total** |  | **19** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 4** |  |  |  |  |  |  |  |  |  |  |
| 22 | Hydraulic and pneumatic transmission | KTN202.2 | 2 | 15 | 30 |  |  |  |  | 60 |  |
| 23 | Applying Softwares in Mechanic | TKM04.2 | 2 | 15 |  |  |  |  | 30 | 60 |  |
| 24 | Workshop internship | TTX02.2 | 2 |  |  |  |  |  | 60 | 60 |  |
| 25 | Ho Chi Minh’ s Thought | HCM01.2 | 2 | 21 | 18 |  |  |  |  | 60 |  |
| 26 | Mechanics of mechanical materials | SBV212.4 | 4 | 45 | 15 |  | 10 | 15 |  | 120 |  |
| 27 | Machine Elements | TKM01.4 | 4 | 45 | 30 |  |  |  |  | 120 |  |
| 28 | Physical education F4 | GDT04.1 | 1 |  |  |  |  |  | 30 | 30 | 21 |
|  | **Total** |  | **17** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 5** |  |  |  |  |  |  |  |  |  |  |
| 29 | a - Theory of internal combustion engine | DCO301.3 | 3 | 30 | 30 |  | 10 |  |  | 90 |  |
| b - Thermodynamics | KTN06.3 | 30 | 30 |  |  |  |  |  |  |
| 30 | Electronic engineering | DTU04.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| 31 | History of the Communist Party of Vietnam | DCS01.3 | 3 | 32 | 26 |  |  |  |  | 90 |  |
| 32 | Project of Machine Elenment | TKM202.1 | 1 |  |  | 15 |  |  |  | 30 |  |
| 33 | a - Automatic control | DKH06.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - Engineering Vibration | KTM03.2 | 24 | 12 |  |  |  |  |  |
| c - Strategy for developing products | TKM201.2 | 24 | 12 |  |  |  |  |  |
| d - Theory of automatic regulation of thermal processes | KTN217.2 | 24 | 12 |  |  |  |  |  |
| 34 | a - Statistics and data processing | DSO06.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - CAE/FEM technology | KTM02.2 | 15 | 30 |  |  |  |  |  |
| c - Theory of fire | KTN302.2 | 24 | 12 |  |  |  |  |  |
| d - Computer operating system | MHT26.2 | 24 | 12 |  |  |  |  |  |
| 35 | Tolerances and mechanical measurements | TKM03.2 | 2 | 15 |  |  |  |  | 30 | 60 |  |
| 36 | a - English B1 | ANHB1.4 | 4 | 45 | 30 |  |  |  |  | 120 |  |
| b - French B1 | PHAPB1.4 | 45 | 30 |  |  |  |  |  |
| c - Russian B1 | NGAB1.4 | 45 | 30 |  |  |  |  |  |
|  | **Total** |  | **19** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 6** |  |  |  |  |  |  |  |  |  |  |
| 37 | Enviromental engineer | KMT32.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| 38 | Mechanical engineering experiment (\*) | TTK02.2 | 2 |  |  |  |  | 60 |  | 60 |  |
| 39 | a - Robot and robot arm in manufacturing | KTM204.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - New material technology | CNG219.2 | 24 | 12 |  |  |  |  |  |
| c -Electrical equipment | KTD.2 | 24 | 12 |  |  |  |  |  |
| d - Structure and calculation of internal combustion engines | DCO207.2 | 24 | 12 |  |  |  |  |  |
| e - Fundamental of power conversion on railway vehicles | DTX265.2 | 24 | 12 |  |  |  |  |  |
| 40 | a - Mechanical English | CK.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| b - Mechanical French | CK.3 | 30 | 30 |  |  |  |  |  |
| c - Mechanical Russian | CK.3 | 30 | 30 |  |  |  |  |  |
| 41 | Mechanical manufacturing technology | CNG02.4 | 4 | 45 | 30 |  | 10 |  |  | 120 |  |
| 42 | a - Recycled energy | KTN301.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - Mechatronic Systems | KTM05.2 | 24 | 12 |  |  |  |  |  |
| c - Automation in mechanical production processes | KTM06.2 | 24 | 12 |  |  |  |  |  |
| d - Fundamental of maintaining and repairing machines and vehicles | DCO203.2 | 24 | 12 |  |  |  |  |  |
| 43 | a - Reliability and machine durability | DTX262.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - Electronic circuit engineering | KTM208.2 | 24 | 12 |  |  |  |  | 60 |  |
| c - Heat exchange equipment | KTN09.2 | 15 | 30 |  |  |  |  | 60 |  |
| d - Mechanical factory design | CNG214.2 | 15 | 30 |  |  |  |  | 60 |  |
| e - Advanced machining process | TKM203.2 | 24 | 12 |  |  |  |  | 60 |  |
|  | **Total** |  | **17** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 7** |  |  |  |  |  |  |  |  |  |  |
| 44 | a - Managemenr Science | QLY06.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - Project and project management | DAN01.2 | 24 | 12 |  |  |  |  |  |
| c - Exhaust gas and exhaust gas treatment | DCO202.2 | 24 | 12 |  |  |  |  |  |
| d -Fundamentals of railway | DTX266.2 | 24 | 12 |  |  |  |  |  |
| e - C++ programming | CPM18.2 | 15 | 15 |  |  |  | 15 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Total** |  | **108** |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

**Specialization 1 :Mechanical Manufacturing Technology**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NO** | **COURSE NAME** | **COURSE ID** | **CREDITS** | **CLASS SESSION** | | **Course design** | **Project** | **PRACTICE** | | **SELF LEARNING** | **Pre-requi-site course** |
|
| **Theory** | **Discussion + Exercise** | **Experiment** | **Practice** |
|  | **SEMESTER 7** |  |  |  |  |  |  |  |  |  |  |
| 45 | Stamping technology | CNG207.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 46 | Equipment for machining stamping | CNG208.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| 47 | Metal casting technology | CNG03.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| 48 | Welding Technology | CNG05.3 | 3 | 30 | 30 |  |  |  |  | 90 |  |
| 49 | CNC machining technology | CNG211.3 | 3 | 24 | 12 |  | 10 |  | 30 | 90 |  |
| 50 | Metal welding Technology Asignment | CNG06.1 | 1 |  |  | 15 |  |  |  | 30 |  |
| 51 | Cutting tool and cutting machine | CNG204.3 | 3 | 30 | 15 |  |  |  | 15 | 90 |  |
|  | **Total** |  | **17** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 8** |  |  |  |  |  |  |  |  |  |  |
| 52 | Project of technology for manufacturing parts | CNG13.1 | 1 |  |  | 15 |  |  |  | 30 |  |
| 53 | Technology of manufacturing parts | CNG12.4 | 4 | 45 | 30 |  |  |  |  | 120 |  |
| 54 | Mechanical assembly technology | CNG215.3 | 2 | 15 | 15 |  |  |  | 15 | 60 |  |
| 55 | Technology of metal forming | CNG209.2 | 2 | 15 |  |  | 10 |  | 30 | 60 |  |
| 56 | Processing technology and surface protection | CNG210.3 | 3 | 30 | 15 |  |  | 15 |  | 90 |  |
| 57 | a - Welding stress and welding deformation | CNG301.2 | 2 | 24 | 12 |  |  |  |  | 60 |  |
| b - Non-traditional machining methods | CNG302.2 | 24 | 12 |  |  |  |  | 60 |  |
| 58 | Specialized internship | CNG16.2 | 2 |  |  |  |  |  | 60 | 60 |  |
|  | **Total** |  | **16** |  |  |  |  |  |  |  |  |
|  | **SEMESTER 9** |  |  |  |  |  |  |  |  |  |  |
| 59 | Engineer graduation internship | CNG17.4 | 4 |  |  |  |  |  | 120 | 120 |  |
| 60 | Engineer graduation project | CNG18.10 | 10 |  |  |  |  |  | 300 | 300 |  |
|  | **Total** |  | **14** |  |  |  |  |  |  |  |  |
|  | **Total** |  | **155** |  |  |  |  |  |  |  |  |

**Specialization 2 :Automation In Mechanical Design**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NO** | **COURSE NAME** | **COURSE ID** | **CREDITS** | **CLASS SESSION** | | **Course design** | **Project** | **PRACTICE** | | **SELF LEARNING** | **Pre-requi-site course** | **Knowledge domains (General, Basic, Specialized, Professional)** |
|
| **Theory** | **Discussion + Exercise** | **Experiment** | **Practice** |
|  | **HỌC KỲ 7** |  |  |  |  |  |  |  |  |  |  |  |
| 45 | a - Computer structure and computer network | MHT25.2 | 2 | 24 | 12 |  |  |  |  | 60 |  | CN |
| b - CIM & FMS | TKM09.2 | 24 | 12 |  |  |  |  |  | CN |
| 46 | CAD/ CAM Technology F1 | TKM08.2 | 2 | 15 |  |  |  |  | 30 | 60 |  | CN |
| 47 | Geometric Modeling in CAD/CAM | TKM07.2 | 2 | 15 |  |  |  |  | 30 | 60 |  | CN |
| 48 | Applying Softwares for analyzing structure and simulating the dynamics of machine | TKM15.2 | 2 | 15 |  |  |  |  | 30 | 60 |  | CN |
| 49 | a - Robot and robot arm in manufacturing | TKM204.2 | 2 | 15 |  |  |  |  | 30 | 60 |  | CN |
| b - Planning production - CAPP | TKM205.2 |  |  |  |  | CN |
| 50 | CNC machines & CNC machining technology | TKM10.3 | 3 | 24 | 12 |  |  |  | 30 | 90 |  | CN |
| 51 | Reverse engineering | TKM302.2 | 2 | 24 | 12 |  |  |  |  | 60 |  | CN |
| 52 | Project of Applying Softwares for analyzing structure and simulating the dynamics of machine | TKM16.1 | 1 |  |  | 15 |  |  |  | 30 |  | CN |
|  | **Cộng** |  | **18** |  |  |  |  |  |  |  |  |  |
|  | **HỌC KỲ 8** |  |  |  |  |  |  |  |  |  |  |  |
| 53 | Mechanical Design Optimization | TKM206.3 | 3 | 24 | 12 |  |  |  | 30 | 90 |  | CN |
| 54 | Machine and mold for plastic part | TKM207.3 | 3 | 24 | 12 |  |  |  | 30 | 90 |  | CN |
| 55 | a - Visual LISP, ActiveX Programming in Mechanical Design | TKM209.2 | 2 | 15 |  |  |  |  | 30 | 60 |  | CN |
| b - Object Oriented Programming with Visual C++, ARX Objects | TKM210.2 | 15 |  |  |  |  | 30 |  | CN |
| 56 | Project of CAD/CAM technology | TKM18.1 | 1 |  |  | 15 |  |  |  | 30 |  | CN |
| 57 | Project of Machine and mold for plastic part | TKM208.1 | 1 |  |  | 15 |  |  |  | 30 |  | CN |
| 58 | Specialized internship | TKM20.2 | 2 |  |  |  |  |  | 60 | 60 |  | CN |
| 59 | CAD/ CAM Technology F2 | TKM17.3 | 3 | 24 | 12 |  |  |  | 30 | 90 |  | CN |
| 60 | Automatic system structure | TKM303.2 | 2 | 24 | 12 |  |  |  |  | 60 |  | CN |
|  | **Cộng** |  | **17** |  |  |  |  |  |  |  |  |  |
|  | **HỌC KỲ 9** |  |  |  |  |  |  |  |  |  |  |  |
| 61 | Graduation internship | TKM21.4 | 4 |  |  |  |  |  | 120 | 120 |  | CN |
| 62 | Graduation project | TKM25.10 | 10 |  |  |  |  |  | 300 | 300 |  | CN |
|  | **Cộng** |  | **14** |  |  |  |  |  |  |  |  |  |
|  | **Tổng cộng số tín chỉ** |  | **155** |  |  |  |  |  |  |  |  |  |

**III.RECOMMENDATIONS AND COMMITMENTS FOR IMPLEMENTATION**

1. Website domain for posting information, learning outcomes and regulations of training institution related to training and scientific research activities:

www.utc.edu.vn and www.utc2.edu.vn

1. Recommendations of training institution

The University of Transport and Communications would like to submit the aforesaid Scheme for registration of offering training major of Mechanical Engineering at full-time undergraduate system to the Ministry of Education and Training for approval as the basis for the University’s implementation from the 2019-2020 academic year.

1. Revised date:

**PRESIDENT**

*(Signature and seal)*