Óbuda University
Donát Bánki Faculty of Mechanical and Safety Engineering

TRAINING PROGRAM

Mechatronic Engineering

BSc

Budapest, 01 September 2017.

MECHATRONIC ENGINEERING DEGREE PROGRAM CURRICULUM

1. Degree program name:

Mechatronic Engineering

2. Field of training:

technical

3. Language of training:

English

4. Training schedule(s) and duration of courses in semesters, number of contact hours:

regular (full-time); 7 semesters; 2385 contact hours

5. Optional specialization:

Industrial Robot Systems

6. Number of credits to collect to earn degree:

210 credits

7. Level of qualification and professional qualification as indicated in the degree certificate:

- level of qualification: bachelor (abbreviated: BSc)
- professional qualification: Bachelor in Mechatronic Engineering

8. Study area classification of professional qualification according to the standard classification system of training areas:

523

9. Educational objective:

The aim is to train mechatronic engineers capable to integrate mechanical engineering with electronics, electrotechnics and computer control synergically; to complete routine design tasks related to mechatronic equipment and processes and smart machines, as well as to operate and maintain them; to introduce and apply mechatronic technologies; to organize process and production control in an energy efficient and environmentally sound manner; and to perform general complexity tasks of technical development and design, also taking labor market demands into consideration. They are prepared to continue their studies at a Masters course.

10. Professional competencies to be mastered:

a) **knowledge**

- Knowledge of the materials applied in mechatronic engineering, their production, features and application criteria.
- Knowledge of mechatronic, electromechanic, IT, and motion control systems, sensors and actuators, their structural components, and basic operations in terms of mechanics, electrotechnics, and control engineering.
- Knowledge of basic mechatronic design principles and methods, including the design basics of mechanical and precision engineering constructions, as well as of analogue and digital circuits.
- Knowledge of calculation, modelling, and simulation methods related to basic mechanical, electrical, and control engineering systems.
- Knowledge of the tools, the component units, the basic design and programming methods of computer control, measurement data collection, embedded systems, optical detection, and image processing.
- Knowledge of the basic measurement procedures used in mechanical engineering and electronics, including tools, instruments, and measuring equipment thereof.
- Knowledge of domestic and international standards and regulations.
- Knowledge of requirement systems related to their special field (safety, health protection, environment protection, SHE), and to quality assurance and control (QA/QC).
- Knowledge of the basics, limitations and requirements of the special fields of logistics, management, environment protection, quality assurance, health and safety, information technology, law, and economics, intrinsically linked to the special field.
- Knowledge of the learning, knowledge acquisition, and data collection methods of the special field, their ethical limitations and problem solving techniques.
- Acquainted with the methods and tools of business economics, and of cost-benefit analysis on a technical basis.

b) **capabilities**

- Able to apply the basic calculation and modelling principles and methods related to the design of mechatronic, electromechanic, and motion control products and technologies in terms of mechanics, electrotechnics, and control engineering as well.
- Able to interpret and characterize the structure and operation of the structural units and components of mechatronic engineering systems, as well as the design and connection of the system components applied, in terms of mechanics, electrotechnics, and control engineering as well.
- Applying technical specifications related to the operation of mechatronic engineering systems, as well as the principles of the adjustment and operation of intelligent machinery and mechatronic engineering equipment, in terms of mechanics, electrotechnics, and control engineering, and understanding related economy considerations as well.
- Controlling and checking special technology production processes with quality assurance and quality control components in mind.
- Able to diagnose failures and to select the appropriate error elimination procedure in terms of mechanics, electrotechnics, and control engineering as well.
- Able to integrate knowledge from the special fields of electronics, mechanical engineering and IT, to apply a systemic approach, to conduct professional discussions with experts of various fields, to present their ideas with professional precision, both verbally and in writing.
- Understand and use characteristic online and printed references of their special field, both in Hungarian and in a foreign language, and keep renewing in possession of such knowledge.

- Adequate perseverance and endurance of monotony to perform practical operations.
- Able to work in a team, to accept and identify with their status in a team.

***c)* attitude**

- Efforts to play a connective and integrative role between the special fields of IT, electrical engineering and life sciences.
- Efforts to make self-education in the special areas of mechatronic engineering – including in particular the partial fields of applied mechanical engineering, electrical engineering, and informatics – a continuous process in line with professional objectives.
- Efforts to solve tasks and make management decisions by being aware of the opinions of the colleagues supervised, possibly in cooperation therewith.
- Open and receptive to the use of new, modern and innovative procedures and methods, particularly in the areas related to organic farming and health awareness.
- Efforts to familiarize with the best practices, new professional knowledge and methods applied in their professional field.
- Working by taking ethical norms into consideration.
- Sharing experiences with colleagues, thus promoting their development.

***d)* autonomy and responsibility**

- Independently selecting and applying relevant problem solving methods in the course of design, operation and inspection tasks.
- Taking responsibility for the findings and professional decisions disclosed in their design and other documentations, as well as for the work processes performed by them and under their supervision.
- Joining work-related research and development projects, mobilizing theory and practice skills and capabilities in cooperation with development team members to achieve the objective.
- Managing the work of the staff they are in charge of as instructed by their workplace supervisor; overseeing the operation of machinery and equipment.
- Acting in a management position, assessing the efficiency, effectiveness and safety of employee work, taking care to promote subordinates' professional development, to manage and help such endeavors.

11. Main training areas:

	Credits
Basic sciences *(35-50* credits*)*	**49**
Economics and Humanities *(14-30 credits)*	**23**
Program core courses *(70-105* credits*)*	**76**
Differential engineering knowledge *(min. 40* credits*)/without thesis work*	**37**
Optional courses *(min. 10* credits*)*	**10**
Thesis work *(15* credits*)*	**15**
Altogether	**210**

12. Criteria prescribed:

Physical education: Each regular student is required to complete two semesters of Physical education. The subject is announced in semesters 2 and 3 in the model curriculum, with a load of 2 lessons per week.

Professional traineeship: Professional traineeship of at least six weeks, organized at a location of professional practice. Professional traineeship is included in the criteria prescribed.

13. Knowledge verification:

a) during the study period, by written or verbal reports, written (classroom) tests, by the evaluation of home assignments (designs, measurement records, etc.), mid-semester grading or signature,
b) by preliminary examination passed in the study period,
c) by examination or comprehensive examination passed in the examination period, and
d) by final examination.

15. Criteria for admission to a final examination:

a) Final completion certificate (absolutorium) granted,

b) Degree project /thesis accepted by supervisor.

Admission to a final examination is subject to a final completion certificate being granted. A final completion certificate is issued by a higher education institution to a student who has complied with the study and examination requirements prescribed in the curriculum and completed the professional traineeship required – except for meeting the foreign language requirement and completion of the degree project / thesis –, and has acquired the credits prescribed.

16. Parts of the final examination:

The final examination consists of defending the degree project / thesis and oral examinations taken on the subjects prescribed in the curriculum (time allowed for preparation: at least 30 minutes per subject), to be passed by the student consecutively within the same day.
Subjects (subject groups) comprising, in the aggregate, a body of knowledge corresponding to at least 20 and up to 30 credit points may be designated for the final examination.

The list of questions of the oral examination is made available to candidates 30 days before the date of the final examination.

Candidates may start the examination if their degree project / thesis has been accepted by the final examination board with at least sufficient (2) qualification. Criteria for correcting a failed degree project / thesis are defined by the competent institute.

17. Result of the final examination:

The result of the final exam (F) is the average of the marks given for the degree project (Dp) and the subjects, as follows:

$$F = (Dp+F1+F2+\ldots+Fm)/(1+m)$$

18. Criteria for issuing a diploma:

Successful final examination

19. Dual training option:

Dual training means common training linked to a regular bachelors training course at the university, and realized within the scope of contractual cooperation between the university, a company (business company, corporation or institution) and a student in order to provide graduate specialists best meeting the company's expectations. Dual training criteria are stipulated in agreements concluded by and between the university and companies and between companies and students, respectively.

20. Cooperative training option:

Cooperative training is a voluntary supplementary practice module linked to a regular bachelors training course at the university, in the framework of which the university and a business company, firm or institution cooperate in order to enable university students to acquire professional experience as specified in the educational objective.

21. Date of entry into effect: 01 September 2017.

Dated in Budapest, 28 November 2016.

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