Basics of Mechatronics

Code: MK3MEALR4RX17-EN

ECTS Credit Points: 4

Evaluation: exam

Year, Semester: 1st year, 1st semester

Its prerequisite(s): -

Further courses are built on it: Yes/No

Number of teaching hours/week (lecture + practice): 2+2

Topics:

The Basics of Mechatronics module has the goal to found the view after high school of an engineering student, an engineer manager and technical standpoint. The important attribute of mechatronics is the interrogation of the building blocks system, this is why it is especially important to gain a deep insight into the foundation, which during the duration of the studies will make it easier to plan the mechatronics system. We will take a look over the most important ways and actual trends in mechatronics. We will try to shed light, so that the description of the physical appearances during the engineering practice it will be known what mathematical approaches will be needed and later on we will take on other subjects as well. The job of an engineer is a lot of times physical reality mixed with abstract math and making a connection between the two. The module will try to shed light on both of these sides.

Literature:

Recommended:

- Husi Géza: Bond Graph DE MK jegyzet
- Husi Géza: Practical Tasks

Schedule

1st week Registration week	
2nd week: **Lecture:** Industry 4.0 mechatronics approach, the place of mechatronics if the field of engineering sciences. **Practice:** Examples of four jointed mechanism themes (movement, increasing speed and strength and emphasis description exercises).	**3rd week:** **Lecture:** Description of moving machines and introduction of their problems and on planar four jointed mechanism. **Practice:** Examples of four jointed mechanism themes (movement, increasing speed and strength and emphasis description exercises).
4th week: **Lecture:** Physical effects and signs of decomposing components, analytical and numerical models, mechatronics, as point of view, classical mechatronics. **Practice:** Examples of four jointed mechanism themes (movement, increasing speed and strength and emphasis description exercises).	**5th week:** **Lecture:** Bond graphs appliance in mechatronics. **Practice:** Bond graphs appliance.
6th week: **Lecture:** Introduction to Robotics, Robotics trends. **Practice:** Bond graphs appliance.	**7th week:** **Lecture:** Opto-mechatronics trends, classical and modern appearance techniques, technics based on illusion, auto stereograms, vehicle mechatronic trends, personal vehicle mechatronics systems.

	Practice: Rated exercise.
8th week: 1st drawing week	
9th week: **Lecture:** Modeling and simulation of mechatronics systems. Creating model – theoretical steps. The role of creating models in mechatronics planning. **Practice:** Modeling four jointed mechanisms.	**10th week:** **Lecture:** System technics: foundation concepts, grouping the systems. **Practice:** Modeling of electrical machines.
11th week: **Lecture:** System technics: Finite dimension dynamic system, inscription of equation. **Practice:** Modeling of thermodynamics 2.	**12th week:** **Lecture:** System technics: Finite dimension dynamic system, inscription of equation. **Practice:** Modeling of thermodynamics 2.
13th week: **Lecture:** System techniques: mathematical tools SISO LTI investigation of the systems functioning, Laplace operational province, bilinear appearance of frequencies reception. **Practice:** strain gauge stamped acceleration sensor modelling 1.	**14th week:** **Lecture:** System techniques: the most important control practice. **Practice:** Strain gauge stamped acceleration sensor modelling 2.
15th week: 2nd drawing week	

Requirements

A, for a signature:

Participation at practice, according to Rules and Regulations of University of Debrecen. The correct solution of homework and submission before deadline. Solving assorted tasks.

B, for a grade:

Oral exam on theoretical part.