| a) General | | | |
|---|---|---|---|
| *School* | ENGINEERING | | |
| *Academic unit* | MECHANICAL ENGINEERING | | |
| *Level of studies* | Undergraduate | | |
| *Course code* | MM907E02 | *Semester* | 7 |
| *Course title* | **Electrical, hydraulic and pneumatic motion systems** | | |

| *Independent teaching activities* | *Weekly teaching hours* | *ECTS* |
|---|---|---|
| Lectures | 4 | 4 |
| Laboratory exercises | | |

| | |
|---|---|
| *Course type* | Special background |
| *Course category* | Compulsory Elective Directions 1 & 2 |
| *Prerequisite courses* | - |
| *Language of instruction and examinations* | Greek |
| *Is the course offered to Erasmus students* | Yes |
| *Course website (url)* | https://eclass.uniwa.gr/courses/MECH158/ |

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

Hydraulic and/or Pneumatic actuating systems can be found in all modern industrial facilities that require power enforcement. Pneumatic positioning systems can be found in food industry due to their “clean” nature and their low maintenance cost whereas hydraulics can be used in applications that demand large forces. The understanding of all operation principles of such systems is a critical issue for a control engineer. In addition to this, the course aims to establish a strong knowledge background in the field so that all multiple devices and available in the market equipment, will be presented thoroughly and examples of circuitry and implementations will be provided. The basic target of controlling the position of actuators of both categories, is going to be categorized and then detailed explained with multiple control methods applied.

b2. General competences

- Search for analysis and synthesis of data and information with the use of the necessary technology
- Working independently
- Team work

c) Syllabus

All pneumatic operation principles and air fluid power analysis, Pneumatic devices and gear (cylinders, valves, sensors, tubing, etc) and their extensive operation principles, Dynamic analysis of piston stroke, mathematical equations and modelling, Combined Pneumatic circuits with multiple applications, examples in the real world and in simulation, Introduction to electrical signal use in pneumatic systems, All Hydraulic operation principles and oil fluid power analysis, Hydraulic devices and gear (cylinders, valves, sensors, piping, etc) and their extensive operation principles, Dynamic analysis of piston stroke, mathematical equations and modelling, Introduction to electrical driven hydraulics systems and applications and Complex Hydraulics circuits with multiple applications.

d) Teaching and learning methods - Evaluation

| | | |
|---|---|---|
| Delivery | Face-to-face, Distance learning | |
| Use of information and communications technology | - Open source software<br>- Multimedia applications<br>- MS Teams and eclass | |
| Teaching methods | *Activity* | *Semester workload* |
| | Lectures | 39 |
| | Tutorials | 13 |
| | Laboratory exercises | 0 |
| | Computational exercises | 26 |
| | Individual work | 52 |
| | Course total | 130 |
| Student performance evaluation | Written final examination: 100%<br>Optional intermediate written progress exam: 20%<br>Optional intermediate assessment in computational problems: 20%<br>Possible distance oral examination if necessary | |

e) Suggested bibliography


1. W. Bolton. Pneumatic and Hydraulic Systems. Butterworth-Heinemann 1997.
2. Harry L Stewart. Hydraulic and Pneumatic Power for Production. Indust P. 1970.