

| | | | |
|--|---|----------------|------|
| Course unit title: | Hydraulics and Pneumatics | | |
| Course unit code: | ME 310 | | |
| Type of course unit: | Compulsory | | |
| Level of course unit: | Bachelor (1st Cycle) | | |
| Year of study: | 3 | | |
| Semester when the unit is delivered: | 5 (Fall) | | |
| Number of ECTS credits allocated : | 6 | | |
| Name of lecturer(s): | Dr. Paris Fokaides | | |
| Learning outcomes of the course unit: | <ol style="list-style-type: none"> 1. Introduction to hydraulic power systems 2. Ideal and real analysis of hydraulic systems components, including oils, transmission lines, pumps, valves, actuators and accessories 3. Introduction to pneumatic power systems | | |
| Mode of delivery: | Face-to-face | | |
| Prerequisites: | ME 200, ME 202 | Co-requisites: | None |
| Recommended optional program components: | None | | |
| Course contents: | <p>Module 1: Introduction to Hydraulic Power Systems</p> <ul style="list-style-type: none"> ▪ The classification of power systems ▪ Basic hydraulic power systems ▪ Advantages and disadvantages of hydraulic power systems ▪ Comparing power systems <p>Module 2: Hydraulic oils</p> <ul style="list-style-type: none"> ▪ Basic properties of hydraulic oils ▪ Classification of hydraulic oils ▪ Requirements imposed on the hydraulic liquids <p>Module 3: Hydraulic transmission lines</p> <ul style="list-style-type: none"> ▪ Hydraulic tubing ▪ Hoses ▪ Pressure and power losses in hydraulic conduits <p>Module 4: Hydraulic pumps</p> <ul style="list-style-type: none"> ▪ Ideal pump analysis ▪ Real pump analysis ▪ Classification of pumps <p>Module 5: Hydraulic systems components</p> <ul style="list-style-type: none"> ▪ Hydraulic control valves ▪ Hydraulic actuators ▪ Hydraulic accessories – accumulators, filters, pressure switches <p>Module 6: Introduction to pneumatic systems</p> <ul style="list-style-type: none"> ▪ Peculiarities of pneumatic systems (compressibility) ▪ Advantages and disadvantages of pneumatic systems ▪ Basic elements of pneumatic systems ▪ Basic pneumatic circuits <p>Module 7: Fluid Mechanics Laboratory Exercises</p> <ul style="list-style-type: none"> ▪ Laboratory Exercise 1: Demonstration of hydraulics power unit ▪ Laboratory Exercise 2: Flow rate and velocity ▪ Laboratory Exercise 3: Cylinders in series ▪ Laboratory Exercise 4: Pressure reducing valves ▪ Laboratory Exercise 5: Introduction to pneumatics ▪ Laboratory Exercise 6: Pressure drop in hydraulic and pneumatic systems | | |
| Recommended and/or required reading: | Rabie, M. G., & Ph. D. (2009). Fluid power engineering (pp. 91-96). New York, NY, USA: McGraw-Hill. | | |
| Textbooks: | <ul style="list-style-type: none"> ▪ Anthony Esposito, "Fluid Power with Applications", Fourth Edition, Prentice Hall | | |

| | |
|---|--|
| | <p>2003</p> <ul style="list-style-type: none"> ▪ Michael J. Pinches, "Power Pneumatics", Prentice Hall 1996 |
| References: | <ul style="list-style-type: none"> ▪ Andrew Parr, "Hydraulics and Pneumatics: A Technician's and Engineer's Guide", 1999 ▪ Ian C. Turner, "Engineering Applications of Pneumatics and Hydraulics", Pearson 1995 ▪ Munson, Young & Okiishi, "Fundamentals of Fluid Mechanics", third edition, John Wiley & Sons, 1988. ▪ James E. Johnson, "Hydraulics for Engineering Technology", Prentice Hall 1996. ▪ Jay. F. Hooper, "Basic Pneumatics. An introduction t industrial compressed air systems and components", Carolina Academic Press 1999 |
| Planned learning activities and teaching methods: | <p>The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks.</p> <p>Lectures are supplemented with laboratory sessions with aim to get acquainted with lab equipment and instruments for measuring temperatures, specific heat capacities, thermal conductivities and other thermal properties.</p> |
| Assessment methods and criteria: | <ul style="list-style-type: none"> • Tests: 25% • Laboratory Work: 25% • Final Exam 50% |
| Language of instruction: | English |
| Work placement(s): | No |