

## COURSE OUTLINE

### GENERAL

<b>SCHOOL</b>	Environment and Agricultural Engineering		
<b>ACADEMIC UNIT</b>	Natural Resources Management and Agricultural Engineering		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	68	<b>SEMESTER</b>	7 <sup>th</sup>
<b>COURSE TITLE</b>	TURBOMACHINERY AND WATER PUMP SYSTEMS		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
Lectures	3	3	
<i>Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).</i>	2	2	
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Special background		
<b>PREREQUISITE COURSES:</b>	<ul style="list-style-type: none"> <li>- Thermodynamics</li> <li>- Physics</li> <li>- Fluid mechanics</li> <li>- Advanced Mathematics</li> </ul>		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>	ELECTRONIC NOTES AND PRESENTATIONS OF THE COURSE ARE AVAILABLE FOR THE STUDENTS OF THE SEMESTER AT THE ADDRESS, <a href="https://oeclass.aua.gr/eclass/">https://oeclass.aua.gr/eclass/</a>		

### LEARNING OUTCOMES

#### Learning outcomes

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*

Specialized knowledge in the field of turbomachinery (fans, pumps, etc.). An introduction to their constructional elements and their thermodynamic analysis is given. Dimensional analysis and similitude. Fluid mechanics related to the operation of water pumps. Students identify the types of water pumps (positive displacement and dynamic type), their basic characteristics and mode of operation. They become familiar with the characteristic curves of water pumps and are trained to select the appropriate water pump and the correct water pump system.

### General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	Project planning and management
Respect for difference and multiculturalism	Respect for the natural environment
Adapting to new situations	Showing social, professional and ethical responsibility and sensitivity
Decision-making	to gender issues
Working independently	Criticism and self-criticism
Team work	Production of free, creative and inductive thinking
Working in an international environment	

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Project planning and management
- Respect for the natural environment
- Production of free, creative and inductive thinking

### SYLLABUS

- Introduction to turbines
- Thermodynamic analysis of turbines and centrifuges
- Applications of turbomachinery
- Turbomachinery and similitude analysis
- Fans and mechanical equipment of ventilated warehouses
- Pressure losses and fan selection
- Fluid mechanics principles related to pump load losses
- Classification of pumps, their main differences, advantages and disadvantages
- Positive displacement, piston, diaphragm and rotary pumps
- Dynamic pumps, centrifugal type
- Deep well pumps, submersible
- Typical pump curves
- Selection of a suitable pump
- Selection and design of a suitable pump assembly

### TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning,</i>	Face-to-face	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education,</i>	Use of ICT in teaching and communication with students	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail. Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	75
	Laboratoy	50
<i>The student's study hours for each</i>	Course total	125

<b>STUDENT PERFORMANCE EVALUATION</b>	
<p><i>Description of the evaluation procedure</i></p> <p><i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other Specifically-defined evaluation</i></p>	<ul style="list-style-type: none"> <li>✓ Problem solving</li> <li>✓ Open-ended questions</li> <li>✓ Course assignments followed by oral examination</li> </ul>

#### ATTACHED BIBLIOGRAPHY

##### E-notes

Βιβλίο [Κωδ. Εύδοξος: 7949]: ΑΝΤΛΙΕΣ, ΑΚΡΙΤΙΔΗΣ ΚΩΝΣΤΑΝΤΙΝΟΣ Λεπτομέρειες

Βιβλίο [Κωδ. Εύδοξος: 22766802]: ΡΕΥΣΤΟΔΥΝΑΜΙΚΕΣ ΜΗΧΑΝΕΣ, ΔΗΜΗΤΡΙΟΣ Γ. ΠΑΠΑΝΙΚΑΣ

**Fluid Mechanics and Thermodynamics of Turbomachinery (7<sup>th</sup> Ed.)**, S.L. Dixon and Cesare Hall, 2014, Butterworth-Heinemann, ISBN: 978-0-12-415954-9,

---

*Environment Control for Animals and Plants. Albright, L. D. St. Joseph, Mich.: AS4E, 1990.*

*Engineering for Storage of Fruits and Vegetables. Ed. Chandra Gopala Rao, Elsevier Science & Technology Books, 2015, ISBN 978-0-1280-3365-4.*

---