

COURSE OUTLINE

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
ACADEMIC UNIT	AGRICULTURE		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	AGRI 805	SEMESTER	8 th
COURSE TITLE	PUMPING SYSTEMS		
INDEPENDENT TEACHING ACTIVITIES <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>	WEEKLY TEACHING HOURS	CREDITS	
lectures	2		
laboratory exercises	2		
TOTAL	4	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialized general knowledge		
PREREQUISITE COURSES:	Physics, Mathematics		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek. Teaching may be performed in English in case foreign students attend the course.		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (English)		
COURSE WEBSITE (URL)			

2. LEARNING OUTCOMES

<p>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</p> <ul style="list-style-type: none"> • 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 • Guidelines for writing Learning Outcomes 			
<p>The course will provide students with specialized knowledge in the field of turbine engines (fans, pumps, etc.), emphasizing into their construction elements as well as their thermodynamic analysis.</p>			
<p>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?</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <p>Search for, analysis and synthesis of data and information, with the use of the necessary technology</p> <p>Adapting to new situations</p> <p>Decision-making</p> <p>Working independently</p> <p>Team work</p> <p>Working in an international environment</p> <p>Working in an interdisciplinary environment</p> <p>Production of new research ideas</p> </td> <td style="width: 50%; border: none;"> <p>Project planning and management</p> <p>Respect for difference and multiculturalism</p> <p>Respect for the natural environment</p> <p>Showing social, professional and ethical responsibility and sensitivity to gender issues</p> <p>Criticism and self-criticism</p> <p>Production of free, creative and inductive thinking</p> <p>.....</p> <p>Others...</p> </td> </tr> </table>		<p>Search for, analysis and synthesis of data and information, with the use of the necessary technology</p> <p>Adapting to new situations</p> <p>Decision-making</p> <p>Working independently</p> <p>Team work</p> <p>Working in an international environment</p> <p>Working in an interdisciplinary environment</p> <p>Production of new research ideas</p>	<p>Project planning and management</p> <p>Respect for difference and multiculturalism</p> <p>Respect for the natural environment</p> <p>Showing social, professional and ethical responsibility and sensitivity to gender issues</p> <p>Criticism and self-criticism</p> <p>Production of free, creative and inductive thinking</p> <p>.....</p> <p>Others...</p>
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<p>Upon successful completion, students will have the knowledge and skills to:</p> <ol style="list-style-type: none"> 1. To distinguish the types of pumps and their basic characteristics. 2. Familiarize themselves with the characteristic curves of the pumps and to select the appropriate pump, as well as the correct layout of the pumping system. 			

By the end of this course the student will have the general skills:

1. Apply knowledge of science and engineering fundamentals
2. Ability to undertake problem identification, formulation and solutions.
3. Communicate effectively with the engineering team and with the community at large.
4. Be creative and innovative.
5. Ability to function effectively as an individual and in multidisciplinary and multicultural teams, as a team leader or manager as well as an effective team member
6. Search for, analysis and synthesis of data and information, with the use of the necessary technology
7. Team work
8. Project planning and management

3. SYLLABUS

1. Introduction to turbines and power turbines
2. Thermodynamic analysis of turbines and power turbines
3. Applications of turbine engines
4. Turbines and similarity relations
5. Fans and mechanical equipment of ventilated warehouses
6. Pressure losses and fan selection
7. Principles of fluid mechanics related to pump head losses
8. Classification of pumps
9. Positive displacement, piston, diaphragm and rotary pumps
10. Dynamic pumps, centrifugal type
11. Deep well pumps, underwater pumps
12. Characteristic curves of pumps
13. Selection of a suitable pump
14. Selection and design of a suitable pumping unit

Laboratory exercises:

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face lectures.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	<ul style="list-style-type: none"> • Use of Information and Communication Technologies (ICTs) (e.g. powerpoint) in teaching. • Use of ICTs in student communication (learning support through the e-class platform). 	
TEACHING METHODS <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. The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	Activity	Semester workload
	Lectures (2 conduct hours per week x 13 weeks)	26
	Tutorials (2 conduct hours per week x 13 weeks)	26
	Hours for private study of the student and preparation for mid-term or/and final examination – Participation in the examinations	73
	Course total	125 hours
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i>	Final mandatory written examination, full length questions and / or multiple-choice questions. Minimum pass grade= 5, scale 0-10.	

<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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>All the above are taking place in Greek as well as in English for foreign students (e.g. ERASMUS students) if any.</p>
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5. ATTACHED BIBLIOGRAPHY

<p><i>-Suggested bibliography:</i></p> <ol style="list-style-type: none"> 1. ΑΝΤΛΙΕΣ, ΑΚΡΙΤΙΔΗΣ ΚΩΝΣΤΑΝΤΙΝΟΣ 2. ΡΕΥΣΤΟΔΥΝΑΜΙΚΕΣ ΜΗΧΑΝΕΣ, ΔΗΜΗΤΡΙΟΣ Γ. ΠΑΠΑΝΙΚΑΣ 3. Fluid Mechanics and Thermodynamics of Turbomachinery (7th Ed.), S.L. Dixon and Cesare Hall, 2014, Butterworth-Heinemann, ISBN: 978-0-12-415954-9,
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