

10.3 CE1013 – Land Reclamation & Irrigation Engineering

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE1013	SEMESTER	10
COURSE TITLE	Land Reclamation & Irrigation Engineering		
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	
	3	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>	Specialization Course		
PREREQUISITE COURSES:	Hydraulics (CE0520) Open Channel Hydraulics (CE0713)		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/PEY131/		

(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>Understanding of the phenomena related to the OBJECT of the course as well as the basic theoretical framework of description of the OBJECT of the course. Application of the basic theoretical framework in dealing with typical problems of the OBJECT of the course.</p> <p>More specifically, the student after the successful completion of the course should:</p> <ul style="list-style-type: none"> • Has advanced knowledge of the theories and principles of Hydrostatics and Hydraulics of closed pipes.
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- Has the ability to solve simple, but also more complex problems in the specialized fields of work related to the subject of the course.
- Has understood the phenomena that govern the movement of water on the ground (saturated or unsaturated)
- Has understood the methodology of assessment of irrigation needs.
- He can design simple irrigation systems of specific requirements.
- Has understood and can describe the basic concepts and principles that govern the design, construction and management of land improvement projects.
- Has understood the basic concepts and principles that govern the design, construction and management of collective irrigation networks.

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

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

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Others...

The course aims that the student acquires - practice the following general skills:

- Search for, analysis of, and synthesis of data and information, implementing appropriate technologies
- Independent work - Team work - Working in an international / interdisciplinary environment
- Decision-taking
- Proact free, creative and inductive thinking
- Project planning and management

(3) SYLLABUS

Land reclamation

Introduction to land improvement projects. Classification of land improvement projects. Utilization and protection of water potential. Construction of drainage - flood works and basic leveling works. Storage and exploitation of surface runoff. Irrigation water transmission and storage systems. Enrichment of underground aquifers. Improvement and protection of soil resources.

Irrigation.

Soil and ground water. Soil characteristics and water-soil interaction phenomena.

Water movement on the ground, Darcy Law. Flow in saturated soil. Methods for measuring soil hydraulic conductivity. Flow in unsaturated soil. Water energy diagrams. Hypersensitivity phenomenon. Water filtration in the soil. Measurement of soil permeability.

Crop soil water. Soil moisture. Soil water capacity. Permanent wilting point. Root layer of crops. Water consumption from crops. Evapotranspiration and methods of its calculation.

Irrigation of crops. Irrigation methods, their main characteristics, advantages and disadvantages, basic principles of design and dimensioning. Surface irrigation methods (by flooding, by limited diffusion, by furrows). Irrigation with irrigation. Drip irrigation. Underground (capillary) irrigation. General provisions and hydraulic calculations.

Collective irrigation networks. Irrigation water distribution methods and systems.

Drainage (Introduction to drainage, drainage works and flood protection.)

Issues of Technical-Economic Management and Environment (Introduction to management, financial analysis and evaluation of land improvement projects. Environmental impact of land improvement projects and environmental protection. Operation and maintenance of land improvement projects.)

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face in-class teaching. When needed, distance teaching (synchronous/asynchronous)														
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of I.C.T. in Teaching and Student Communication														
TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>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> <i>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>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Activity</th> <th style="text-align: center;">Semester workload</th> </tr> </thead> <tbody> <tr> <td>In Class (/Distance) Teaching</td> <td style="text-align: center;">39</td> </tr> <tr> <td>Literature Study</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Exercises / Paradigms</td> <td style="text-align: center;">31</td> </tr> <tr> <td>Project assignment / Essay</td> <td style="text-align: center;">30</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>Course total</td> <td style="text-align: center;">150</td> </tr> </tbody> </table>	Activity	Semester workload	In Class (/Distance) Teaching	39	Literature Study	50	Exercises / Paradigms	31	Project assignment / Essay	30			Course total	150
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STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <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> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	<p>Language of evaluation: Greek</p> <p>Written examination, 2,5-hours Problem solving, Multiple choice test, Questions and Answers, Written Essay / Project</p> <p>The evaluation criteria are announced to the students well before the examination; weights per subject /exercise are explicitly indicated.</p> <p>The examination results (including total / partial grading) are announced on the web. Students may require to have access to their tests, they may ask for clarifications on mistakes, grading etc.</p>														

(5) ATTACHED BIBLIOGRAPHY

<p><u>Greek Bibliography:</u></p> <ol style="list-style-type: none"> 1. Παπαζαφειρίου, Ζ. Γ. «Αρχές και πρακτική των αρδεύσεων» Θεσσαλονίκη : Ζήτη, 1994, Κωδικός Βιβλίου στον Εύδοξο: 10992. 2. Διεθνής Επιτροπή Αρδεύσεων και Αποστραγγίσεων «Πολύγλωσσο τεχνικό λεξικό αρδεύσεων και αποστραγγίσεων» / “Multilingual technical dictionary on irrigation and drainage” Αθήνα: ΤΕΕ, 1975 (βιβλιοθ. ΤΕΙ-Α) 3. Τσακίρης, Γ. «Υδραυλικά Έργα: Σχεδιασμός & Διαχείριση», Τόμος ΙΙ: Εγγειοβελτιωτικά Έργα, Εκδόσεις Συμμετρία, Αθήνα 2006, ISBN 960-266-171-2, Κωδικός Βιβλίου στον Εύδοξο: 45381. 4. Πουλοβασιλής Α., ΕΙΣΑΓΩΓΗ ΣΤΙΣ ΑΡΔΕΥΣΕΙΣ, Εκδότης Έμβρυο, 2010, Κωδικός Βιβλίου στον Εύδοξο: 86200480 5. Τερζίδης, Γ.Α., Παπαζαφειρίου, Ζ.Γ. «Γεωργική υδραυλική», Θεσσαλονίκη: Ζήτη, 1997, Κωδικός Βιβλίου στον Εύδοξο: 11157. 6. Παπαδόπουλος, Γ. Ε. «Τυποποιήσις ονοματολογίας και συμβολισμού αρδευτικών δικτύων» / “Standard nomenclature and symbols for elements of irrigation canal network systems”, Διεθνής Επιτροπή Αρδεύσεων και Αποστραγγίσεων, Αθήνα: ΤΕΕ, 1969 7. Weizman, E., Zonn, J., Παπαδόπουλος, Γ. Ε., Σαλάπας, Κ. «Στάγδην άρδευσις», Ελληνική Επιτροπή Αρδεύσεων - Αποστραγγίσεων, Ε.Σ.Σ.Δ. Υπουργείου Εγγειοβελτιώσεων και Υδατικής Οικονομίας.

Επιστημονική Γενική Διεύθυνσις. Κεντρική Υπηρεσία Επιστημονικής και Τεχνικής Ενημερώσεως, Αθήνα : ΤΕΕ , 1973 (βιβλιοθ. ΤΕΙ-Α).

Foreign Bibliography:

1. Cuenca, R.H. "Irrigation System Design: An Engineering Approach", Prentice Hall, 1989, ISBN 0-13-506163-6 (Βιβλιοθήκη ΤΕΙ-Α)
2. Food and Agriculture Organization of the United Nations "Irrigation in the Near East region in figures", Rome: Food and Agriculture Organization of the United Nations, 1997 (βιβλιοθ. ΤΕΙ-Α).
3. Leliavsky, S. "Irrigation engineering: Canals and barrages" London : Chapman & Hall, 19-- (βιβλιοθ. ΤΕΙ-Α)
4. Raghunath, H. M. "Ground water: Hydrogeology, ground water survey and pumping tests, rural water survey and pumping test, rural water supply and irrigation systems", New Delhi: New Age International Publishers , 1987 (βιβλιοθ. ΤΕΙ-Α)
5. Wilcox, C. "Sugar water: Hawaii's plantation ditches" Honolulu: University of Hawai'i Press, 1997, c1996 (βιβλιοθ. ΤΕΙ-Α).

Internet:

(I) Food & Agriculture Organization (FAO) United Nations (UN). By using the proper keywords (e.g. irrigation) in the search engine (<http://www.fao.org/documents/>) we get:

I.1. Tanji, K.K., Kielen, N.C. "Agricultural Drainage Water Management in Arid and Semi-Arid Areas" FAO Irrigation and drainage paper 61, Food & Agriculture Organization of the UN, Rome, 2002, Reprinted 2003 ISBN 92-5-104839-8 (available at <http://www.fao.org/docrep/005/y4263e/y4263e00.htm>)

I.2. Ongley, E.D. "Control of water pollution from agriculture - FAO irrigation and drainage paper 55" Food and Agriculture Organization of the United Nations, Rome, 1996 ISBN 92-5-103875-9 available at <http://www.fao.org/docrep/W2598E/W2598E00.htm>

I.3. Allen, R.G., Pereira, L.S., Raes, D., Martin Smith "Crop evapotranspiration - Guidelines for computing crop water requirements" - FAO Irrigation and drainage paper 56, FAO - Food and Agriculture Organization of the United Nations, Rome, 1998, ISBN 92-5-104219-5, available at <http://www.fao.org/docrep/X0490E/X0490E00.htm>

I.4. Dougherty, T.C., Hall, A.W. "Environmental impact assessment of irrigation and drainage projects", 53 FAO Irrigation and Drainage Paper, Rome 1995, ISBN 92-5-103731 -0, available at <http://www.fao.org/docrep/V8350E/V8350E00.htm>

I.5. W.H. van der Molen, J. Martínez Beltrán, W.J. Ochs, "Guidelines and computer programs for the planning and design of land drainage systems", FAO Irrigation and Drainage Paper 62, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 2007, ISBN 978-92-5-105670-7, available at <http://www.fao.org/docrep/010/a0975e/a0975e00.htm>

I.6. W.R. Walker "Guidelines for designing and evaluating surface irrigation systems" FAO Irrigation and Drainage Paper 45, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 1989, ISBN 92-5-102879-6 available at <http://www.fao.org/docrep/T0231E/T0231E00.htm>

I.7. FAO "Materials for Subsurface Land Drainage Systems" FAO Irrigation and Drainage Paper 60, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 2007 Available at

I.8. D. Renault, T. Facon, R. Wahaj, "Modernizing irrigation management – the MASSCOTE approach", FAO Irrigation and Drainage Paper 63, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 2007, ISBN 978-92-5-105670-7, available at <http://www.fao.org/docrep/010/a1114e/a1114e00.htm>

I.9. Sagardoy, J.A., Bottrall, A., Uittenbogaard, G.O. "Organization, operation and maintenance of irrigation schemes" - FAO irrigation and drainage paper 40, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS Rome, 1986, Reprinted 1986 ISBN 92-5-101245-8, Available at <http://www.fao.org/docrep/X5647E/X5647E00.htm>

I.10. FAO "Performance Analysis of On-demand Pressurized Irrigation Systems", FAO Irrigation and Drainage Paper 59 - FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS Rome, 2007, available at <http://www.fao.org/docrep/010/ah860e/ah860e00.htm>

I.11. Rhoades, J.D., Kandiah, A., Mashali, A.M. "The use of saline waters for crop production" - FAO irrigation and drainage paper 48, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS Rome, 1992, ISBN 92-5-103237-8 available at <http://www.fao.org/docrep/T0667E/T0667E00.htm>

I.12. P.L. Fraenkel "Water lifting" FAO Irrigation and Drainage Paper 43, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, Rome, 1986, ISBN 92-5-102515-0, available at <http://www.fao.org/docrep/010/ah810e/ah810e00.htm>

I.13. Ayers, R.S., Westcot, D.W. "Water quality for agriculture" FAO Irrigation and Drainage Paper, 29 Rev. 1, ISBN 92-5-102263-1, available at <http://www.fao.org/DOCREP/003/T0234E/T0234E00.HTM>

I.14. Pescod, M.B. "Wastewater treatment and use in agriculture" - FAO irrigation and drainage paper 47 - FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS - FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS Rome, 1992 ISBN 92-5-103135-5, available at <http://www.fao.org/docrep/T0551E/T0551E00.htm>