

7.5 CE0714 – Road and Airfield Pavements & Laboratory Testing

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE0714	SEMESTER	7
COURSE TITLE	Road and Airfield Pavements & Laboratory Testing		
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	
	4	4	
<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>	Special Background Course		
PREREQUISITE COURSES:	-		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes, for interested students (in English)		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/CIV289/		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course aims to provide theoretical basis, practical skills and knowledge on road and airport pavement design and construction, which require and utilize related experience and evaluation of the transportation infrastructure background that students have already received by other courses (e.g. road design). Familiarization with the national and international standards and requirement related to pavement engineering laboratory testing is another major issue of the course, aiming to assist the students to better understand the pavement engineering aspects and to prepare them for a successful participation in related projects.</p> <p>Upon completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> • Understand the necessity and complexity of road and airport pavement design and construction • participate in laboratory-related design and construction procedures, as well as in the forecasting and appreciation of related construction costs for road and airport pavements

- Identify the engineering properties of different road and airport pavement models and cross sections, and provide the specifications for the related construction materials
- evaluate the properties of soil and unbound aggregate pavement materials
- participate in working groups for bitumen mix designs, for laboratory testing of materials and for quality assurance for road and airport pavements
- undertake empirical, mechanistic and analytical design for flexible and rigid pavements

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 at the following general competences:

- Search, analysis and synthesis of data and information, using the necessary technologies
- Adapting to new situations
- Decision-making
- Working independently
- Team work
- Project planning and management
- Production of free, creative and inductive thinking

(3) SYLLABUS

The course contains theoretical section and laboratory section with the following objectives:

Course Theoretical Section

- Bituminous Materials: Bitumen nature, production and composition, physical and chemical properties. Bitumen application. Paving asphalt and insulation bitumen. Investigation and testing of bituminous materials.
- Bitumen standard tests. Paving asphalt materials. Bitumen solutions and emulsions. Emulsified mix curing, abrasion, and related tests. Applications of bitumen emulsions in engineering.
- Design and construction of asphalt concrete pavement layers.
- Aggregate and asphalt concrete mixes. Assessment of test results.
- Production of asphalt mixes. Description of contemporary asphalt mix plants. Types of bituminous coatings
- Critical construction aspects. Formation of asphalt surfaces. Rehabilitation of asphalt layers. Asphalt pavement inlays and overlays. Asphalt pavement recycling.
- Deterioration, damage and maintenance of asphalt pavements. Skid-resistant pavement surfaces.
- Aircraft types, loads and speed. Aircraft ground movement. Runway operation.
- Runways, taxiways and aprons.
- Airport pavement condition investigation. Subgrade assessment. Flexible and rigid pavements.

Course Laboratory Section

- Visual examination of bituminous materials. Investigation of bitumen properties, quality and compatibility with construction standards and requirements
- Description of testing equipment. Specimen preparation.
- Apparatus preparation for testing of asphalts, bitumen emulsions and bituminous mixes.
- Laboratory testing according to international (e.g. AASHTO, EN, DIN) and national standards (ETEP)
- Assessment of testing results.

(4) TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;">DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	Face-to-face															
<p style="text-align: center;">USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	Communication with the students through email and the website of the course (Open E-Class). Learning process support by providing lecture notes, additional exercises and resolved examples on the course website.															
<p style="text-align: center;">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></p> <p><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></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity</i></th> <th style="text-align: center;"><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures & Classwork</td> <td style="text-align: center;">40</td> </tr> <tr> <td>Study and analysis of bibliography</td> <td style="text-align: center;">35</td> </tr> <tr> <td>Laboratory Practice</td> <td style="text-align: center;">15</td> </tr> <tr> <td>Project implementation</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;">120</td> </tr> </tbody> </table>		<i>Activity</i>	<i>Semester workload</i>	Lectures & Classwork	40	Study and analysis of bibliography	35	Laboratory Practice	15	Project implementation	30			Course total	120
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<p style="text-align: center;">STUDENT PERFORMANCE EVALUATION <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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>The final evaluation of the students partially (70% typically) in writing and partially (30% typically) in individual project assessment and oral examination. The written exam contains short-answer knowledge and judgement questions, multiple-choice questionnaire and problem solving, whereas the project evaluation includes laboratory test assessment and utilization of results for pavement design.</p> <p>The evaluation criteria are presented to the students at the beginning of the course, the grading of all problems and questions are shown and the final grades are available through the platform of the university. The students can review their projects, as well as their written solving process, the grades assigned to each problems and explanations are given to them for their mistakes, if any.</p> <p>The evaluation language is Greek, expect for the Erasmus students, which is English.</p>															

(5) ATTACHED BIBLIOGRAPHY

<p><u>In Greek:</u></p> <ol style="list-style-type: none"> 1. E. J. Yoder , M. W. Witczak. Principles of Pavement Design. (Greek Ed: Giourdas E., 2000) 2. Nikolaidis, A. Highway Engineering: Pavements, Materials and Control of Quality. (in Greek 4th ed: 2019. Ed. In English by CRC Press, 2014). <p><u>In English/International:</u></p> <ol style="list-style-type: none"> 1. AASHTO, «Guide for Design of pavement structures», 1993/ed.2007 2. Huang Y.H. Pavement Analysis and Design. Pearson Prentice Hall, NJ, 2004 3. Federal Aviation administration, «Airport Pavement Design and Evaluation», Advisory Circular 150/5320-6G, Washington DC, 2021. 4. Federal Aviation administration, «Airport Pavement Construction», Advisory Circular 150/5370-10H, Washington DC, 2018. 5. International Civil Aviation Organization, «Aerodrome Design Manual (Part 3 _ Pavements) second edition», I.C.A.O. publications, 1983. <p><u>Related academic journals:</u></p> <ol style="list-style-type: none"> 1. Journal of Transportation Engineering Part 2: Pavements (ASCE - American Society for Civil Engineering) 2. International Journal of Pavement Engineering. Taylor & Frances 3. Road Materials and Pavement Design. Taylor & Frances
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