COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΓΚ2001	**SEMESTER**	5th
COURSE TITLE	Highway Engineering I		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
-	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	General background
PREREQUISITE COURSES:	• Mathematics I and II • Applied Physics • Descriptive Geometry • Technical Drawing Techniques
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	-

(2) 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*
- *Guidelines for writing Learning Outcomes*

The aim of this course is to understand the theoretical knowledge, regulations, and other essential elements for road alignment design, as well as to carry out the necessary calculations.

Upon successful completion of the course, students will have all the knowledge required to carry out any road construction study (road axis).

Students will have the opportunity to design a road from scratch on an uneven terrain with contour lines. They will learn, among other things, how to design the horizontal alignment, vertical alignment, cross-sections, and calculate earthworks, proceeding to the preliminary measurement and budget of the road. At the same time, they will be trained on commercial software tools they will encounter in their professional or research careers. This practical training will adequately prepare them both for entering the professional market and for continuing their studies at the research level.

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*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

The purpose of the course is to provide students with the knowledge, necessary tools, and strategies required in order to:

- Align a road on a topographic background by identifying the key passage points of the road and designing the horizontal alignment, vertical alignment and cross-sections.
- Perform all necessary calculations for the geometric alignment.
- Calculate all required earthworks and estimate the construction cost of the road.
- Use specialized road design software.
- Address practical issues in road design and construction studies.
- Collaborate in teams to solve technical problems.
- Prepare for their professional and research careers.

(3) SYLLABUS

1. Design and Construction of Road Projects
2. Design Procedure. Methodology
3. Design Procedure. Methodology
4. Horizontal Alignment
5. Vertical Alignment
6. Super Elevation Diagrams
7. Cross sections
8. Road Safety by Design (Criteria)
9. Road Widening Study
10. Visibility Study
11. 3D Road Design
12. Earthworks Calculation
13. Tender Documents
14. Environmental Aspects relating to Road Projects

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	The course is delivered face-to-face. During the delivery of the course topics, visual aids will be used to display the lessons through the projector in the classroom, as well as the use of the blackboard. Additionally, educational videos and specialized road design software will be utilized. Specifically, the main training will be conducted through paper exercises so that each student becomes familiar with the basic elements of road alignment and its components. In the laboratory classes, specific exercises will be given, as well as a project involving the complete design of a short road. The work will be done primarily by hand and secondarily through computer programs commonly used in

	practice. Finally, the training material will be available on the e-learning platform eClass (https://eclass.uth.gr/) so that students can refer to the material at any time. At the same time, there will be direct communication with students for resolving questions via email.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	E-CLASS, Cloud, Email, etc.
TEACHING METHODS *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*	

Activity	*Semester workload*
Lectures	50%
Laboratory	20%
Exercises	20%
Visits at facilities	10%
Course total	*100%*

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *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 criteria are given, and if and where they are accessible to students.*	Language of examinations: Greek - Written Exam 1st Progress: 12.5% of final grade - Written Exam 2nd Progress: 12.5% of final grade - Written Exam of the Period: 50% of final grade - Submission of Road Alignment Project (Written & Oral Exam): 25% of final grade

(5) SUGGESTED BIBLIOGRAPHY

-Suggested bibliography:

OMOE (National Road Design Guidelines)
Geometric Design of Highways & Streets [AASHTO 2004]
Handbook of Road Safety Measures 2ND edition, Rune Elvik et all
Handbook of Road Technology, Fourth Edition M.G.LAY
HIGHWAY DESIGN, Theory & Practice (A. Apostoleris)
Highway Design & Construction Henning Natzschka

- Related academic journals:

World Highways
Routes/Roads Magazine (PIARC)