COURSE OUTLINE

(1) GENERAL

SCHOOL			
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**108**	**SEMESTER**	**6,8**
COURSE TITLE	Differential Geometry		

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	4
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, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
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*

This course gives students basic knowledge of classical differential geometry of curves and surfaces. Among other students will learn and understand the particular interest of some curves and surfaces such as the catenary, the tractrix, the cycloid, the surfaces of constant Gaussian curvature and the minimal surfaces. After successful completion of the course students will be able to:

- Calculate the curvature and torsion of a curve.
- Find the moving trihedron of a curve and write its intrinsic and canonical equations.
- Find the osculating surface and the osculating curve at any point of a given curve.
- Calculate the first and the second fundamental forms of a surface.
- Calculate the Gaussian curvature, the mean curvature, the curvature lines, the asymptotic lines, the geodesics of a surface.
- Use efficiently the mathematical tool of tensor calculus in the study of surfaces.

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…*
	…….

Analysis and synthesis of data with the use of the appropriate technologies.
Autonomous work.
Promotion of creative and inductive thinking.

(3) SYLLABUS

Theory of curves. Curvature and torsion. The Frenet equations and the Fundamental theorem of curve theory. Theory of surfaces. The tangent plane. Elements of tensor algebra. First and second fundamental forms. The Gaussian curvature and the mean curvature of a surface. The Gauss and Codazzi equations. The curvature tensor. Gauss's egregium theorem. The fundamental theorem of surface theory. Covariant differentiation and parallel transport. Geodesics. Intrinsic geometry. Special surfaces.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	
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*	
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.*	

Activity	*Semester workload*
Lectures	39
Tutorials	13
	30
	15
Examinations	3
Course total	100

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Notes of the lectures from the teacher.
- Differential Geometry, Martin M. Lipschutz, Schaum's outline Series, ΕΣΠΙ, Αθήνα (1981).
- Andrew Pressley, Elementary Differential Geometry, Πανεπιστημιακές Εκδόσεις Κρήτης, (2011).

- Related academic journals: