COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_PM333	**SEMESTER OF STUDIES**	8th
COURSE TITLE	DIFFERENTIAL GEOMETRY II		

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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Tutorials	4	6
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*	Compulsory course for the specialization *Pure Mathematics* Elective course for each of the other specializations
PREREQUISITE COURSES:	Recommended prerequisite knowledge: DIFFERENTIAL GEOMETRY I
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBPAGE (URL)	https://eclass.math.upatras.gr/courses/MATHDEP296/ https://eclass.upatras.gr/courses/MATH913/

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*

Students will be able to define charts on a smooth surface, check if a map between surfaces is smooth. To find Christoffel's symbols. To compute the covariant derivative of a vector field. To prove Hilberts and Liebmann's theorems. To find the geodesics on simple surfaces. To state and apply Meusnier's theorem. To state the Gauss-Bonnet theorem (local and global version) and apply it on various problems.

General Abilities

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	*Others…*
Production of new research ideas	

- Investigation, analysis and synthesis of data and information, by using appropriate technology tools.
- Adaptation into new environments.
- Independent work.
- Team work.
- Exercise judgment and self-evaluation.

3. COURSE CONTENT

Proof of Theorema Egregium, charts and local coordinate systems (atlas), smooth maps between surfaces, differential of a smooth map, normal and geodesic curvature, Meusnier's theorem, vector fields on surfaces, covariant derivative of vector fields, parallel transport, Christoffel symbols, Hilbert's theorem, Liebmann's theorem, geodesics, minimal surfaces, Gauss-Bonnet theorem (local-global version and applications).

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Lectures (face to face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	There is use of *Mathematica* for graphing surfaces. Various problems and other course material is posted in online platform *eClass*.
TEACHING ORGANIZATION *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 ASSESSEMNT *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.*	**Assessment Language:** Greek **Assessment Language for Erasmus students:** English **Assessment methods** ✓ Written final examination which includes theory and problems. ✓ Small projects presented in class. Minimum passing grade: 5 Maximum passing grade: 10

Activity	***Semester workload***
Lectures	39
Tutorials	13
Solving course assignments	25
Individual study	70
Final examination	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***150***

5. RECOMMENDED LITERATURE

(*in Greek*)

- Παπαντωνίου Βασίλειος. *Διαφορική Γεωμετρία.* Εκδόσεις Εταιρείας Αξιοποίησης και Διαχείρισης Περιουσίας Πανεπιστ. Πατρών, 2016.
- Αρβανιτογεώργος Ανδρέας. *Στοιχειώδης Διαφορική Γεωμετρία.* (e-book). Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Αποθετήριο "Κάλλιπος", 2015.
- Barett O'Neil. *Στοιχειώδης Διαφορική Γεωμετρία.* 3η Έκδοση, Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2005.
- Pressley Andrew. *Στοιχειώδης Διαφορική Γεωμετρία.* 3η Έκδοση, Εκδόσεις ΙΤΕ – Πανεπιστημιακές Εκδόσεις Κρήτης, 2011.

(*in English*)

- Pressley Andrew. *Elementary Differential Geometry*. 2nd Edition, Springer, 2010.
- Do Carmo Manfredo. *Differential Geometry of Curves and Surfaces*. Prentice Hall, 1976.