

## COURSE OUTLINE

### (1) GENERAL

<b>SCHOOL</b>	UNIVERSITY OF THESSALY		
<b>ACADEMIC UNIT</b>	DEPARTMENT OF CIVIL ENGINEERING		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	FK0205	<b>SEMESTER</b>	2
<b>COURSE TITLE</b>	CALCULUS II		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <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>		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
LECTURES		4	5
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialized general knowledge, skills development</i>	General Background		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes		
<b>COURSE WEBSITE (URL)</b>	<a href="https://eclass.uth.gr/courses/CULT_U_126/">https://eclass.uth.gr/courses/CULT_U_126/</a>		

### (2) LEARNING OUTCOMES

<p><b>Learning outcomes</b>  <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>Consult Appendix A</p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</li> <li>• Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</li> <li>• Guidelines for writing Learning Outcomes</li> </ul>
<p>The course in the field of knowledge features advanced knowledge in a field of study that entail a critical understanding of theories. It requires advanced skills and provides the opportunity for solving complex problems in Differential Calculus of functions of several variables and Integral Calculus of multiple integrals.</p>

**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 course aims at Independent Work, Exercising Critical Thinking and Promoting Free, Creative and Inductive Thinking

**(3) SYLLABUS**

- Vector functions and elements of curve theory in space (curves in the space, isoplanes, tangent and perpendicular vector to a curve, curvature and torsion, derivation and integration of vector functions, triangular and Frenet's triangle, kinematics and dynamics in polar-cylindrical coordinates).
- Multivariable functions (Limits, continuity and diffusion in  $R^n$ , partial derivative, directed derivative, total differential and perfect differential, vector fields, gradient, divergence and vorticity, inverse theorem function theorem, complex function theorem, functional dependence, local, total, and bounded extrema, Lagrange multipliers).
- Multiple integrals (Double integrals in orthogonal and polar coordinates, Fubini's theorem, calculation of areas and centers of mass, triple integrals, triple integrals in polar and polar coordinates, Fubini's theorem integrals in rectangular, cylindrical, and spherical coordinates, calculation of volumes and masses).
- Epicyclic and surface integrals (Epicyclic integrals of 1st and 2nd kind, vector field circulation, path independent epicycles, power work, Green's theorem, simple and multiple coherent loci of  $R^2$ , elements of surface theory, surface integrals of 1st and 2nd kind).
- Vector analysis (potential functions and conservative fields, divergence theorem (Gauss), Stokes theorem).

**(4) TEACHING and LEARNING METHODS - EVALUATION**

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

<i>students</i>		
<p><b>TEACHING METHODS</b></p> <p><i>The manner and methods of teaching are described in detail.</i></p> <p><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>	<i>Activity</i>	<i>Semester workload</i>
	Lectures - Study	150
	Course total	150
<p><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><b>Description of the evaluation procedure</b></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 Assessment procedure is written in Greek with Topics including the examination of theorems with proofs and definitions. In addition, Problems and Exercises are given for solution covering a large part of the course.</p> <p>The assessment criterion is the student's performance in the final written examination of the course.</p>	

#### (5) ATTACHED BIBLIOGRAPHY

**-Suggested bibliography:**

1. Infinite calculus, Briggs William, Cochran Lyle, Gillett Bernard
2. THOMAS CALCULUS [George B. Thomas], Jr., Joel Hass, Christopher Heil, Maurice D. Weir
3. TENSOR ANALYSIS, Kravvaritis D. Details
4. Multi-Variable Functional Calculus and Introduction to Differential Equations, 2nd Edition, Papachinopoulos G. - Schinas H. - Mylonas N. Details
5. Applied Analysis and Fourier Theory, Filippakis M
6. Differential and Integral Calculus of Multivariable Functions, Georgiou Dimitrios, Karakasidis Theodoros, Megaritis Athanasios.
7. Rassias Th., Mathematics I, Ed. Chotra