

## COURSE LAYOUT

### 1. GENERAL

<b>SCHOOL</b>	SCHOOL OF ENVIRONMENT AND AGRICULTURAL ENGINEERING		
<b>DEPARTMENT</b>	NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
<b>STUDY LEVEL</b>	Undergraduate		
<b>COURSE CODE</b>	3690	<b>SEMESTER</b>	2 <sup>nd</sup>
<b>COURSE TITLE</b>	Vector Calculus (OBLIGATORY)		
<b>INDEPENDENT TEACHING ACTIVITIES</b>		<b>WEEKLY TEACHING HOURS</b>	<b>ECTS</b>
Lectures		3	
Lab		2	
			5
<b>COURSE TYPE</b>	Infrastructure/ General knowledge/ Skills development		
<b>PREREQUISITES</b>	Introduction to Calculus and Linear Algebra		
<b>LANGUAGE</b>	Greek		
<b>IS THE COURSE OFFERED for ERASMUS STUDENTS?</b>	Yes (in Greek)		
<b>COURSE WEB PAGE</b>	<a href="https://oeclclass.aua.gr/eclclass/courses/5929/">https://oeclclass.aua.gr/eclclass/courses/5929/</a>		

### 2. LEARNING OUTCOMES

<b>Learning Outcomes</b>
<p>After successful completion this course, the student is expected to be able to:</p> <ul style="list-style-type: none"> <li>• use and apply definitions and notions of Vector Calculus in a pure and applied sense.</li> <li>• use and apply mathematical methods in basic problems via systemic approach</li> <li>• develop critical thinking through result verification</li> </ul>
<b>General Competenses</b>
<ol style="list-style-type: none"> <li>1) Adapt to new situations.</li> <li>2) Make decisions.</li> <li>3) Work autonomously.</li> <li>4) Create new research ideas.</li> <li>5) Advance free, creative and inductive thinking.</li> </ol>

### 3. COURSE CONTENT

<ol style="list-style-type: none"> <li>1) FUNCTIONS OF SEVERAL VARIABLES: Basic definitions, examples</li> <li>2) PARTIAL DERIVATIVES, CHAIN RULES.</li> <li>3) DIRECTIONAL DERIVATIVE, GRADIENT, TANGENT PLANES AND LINES.</li> <li>4) LOCAL MAXIMA AND MINIMA, LAGRANGE MULTIPLIERS</li> <li>5) DOUBLE AND TRIPLE INTEGRATION, CALCULATION OF AREA AND VOLUME.</li> <li>6) LENGTH OF A CURVE, INTEGRATION OF REAL FUNCTIONS ALONG CURVES.</li> </ol>
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7) VECTOR FIELDS, INTEGRATION, CONSERVATIVE VECTOR FIELDS.  
8) GREEN AND STOKES THEOREMS.

#### 4. TEACHING and LEARNING METHODS - Evaluation

<b>TEACHING METHOD</b>	Live, face to face teaching in the classroom	
<b>USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES</b>	Educational material, updates and announcements available via Open e-class platform.	
<b>TEACHING ORGANISATION</b>	<i>Activity</i>	<i>Work Load (hours)</i>
	Lectures	39 hours
	Lab	26 hours
	Individual study	60 hours
	Total contact hours and training(25 hours per ECTS)	125 hours (5 ECTS)
<b>STUDENTS EVALUATION</b>	Written examination of gradual difficulty, based on the lectures offered, containing: - Problems and/or exercises. - Comprehension questions.	

#### 5. BIBLIOGRAPHY

1. J. Hass, C. Heil, D. Weir, Thomas Απειροστικός Λογισμός. Πανεπιστημιακές εκδόσεις Κρήτης, 2018.
2. W. Briggs, L. Cochran, B. Gillet, Απειροστικός Λογισμός, Εκδόσεις Κριτική, 2018.
3. Ν. Μυλωνας, Χ. Σχοινας, Γ. Παπασχοινοπουλος, Λογισμός Συναρτήσεων μιας μεταβλητής και Γραμμική Αλγεβρα, Εκδόσεις ΤΖΙΟΛΑ, 2021.
4. Α. Θεοδώρου, Εφαρμοσμένα Μαθηματικά Θεμέλια Θετικών και Περιβαλλοντικών Επιστημών, UNIBOOKS, 2019.