

COURSE DESCRIPTION

1. GENERAL

SCHOOL	MUSIC AND AUDIOVISUAL ARTS		
DEPARTMENT	AUDIO AND VISUAL ARTS		
LEVEL	Undergraduate		
COURSE CODE	TEC414	SEMESTER	4 th
COURSE TITLE	Mathematics for Audiovisual Technology		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	ECTS	
Lecture, Lab Lecture	4	7	
COURSE CATEGORY	General Background		
COURSE TYPE	Elective		
PREREQUISITES	THE104		
LANGUAGE OF TEACHING and EXAMINATIONS	Greek		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES (In English)		
URL	https://avarts.ionio.gr/en/studies/undergraduate/courses-descriptions/tec414/		
ECLASS	https://opencourses.ionio.gr/modules/contact/index.php?course_id=2321		

2. TEACHING RESULTS

Teaching Results
<p>The objective of the course is to provide to the students a general overview of the fundamental mathematics that are used in the audio and image processing together with the mathematics needed for 2d and 3d computer graphics.</p> <p>The successful attendance of the course offers the ability to the corresponding students to:</p> <ul style="list-style-type: none"> • draw plots of functions and curves both in theory and in the computer • know the derivatives (one or two variables) and calculate intergals • understand analytic geometry and discrete mathematics • write code in Octave (or MATLAB) that is applied for mathematical transforms
General Skills
<ul style="list-style-type: none"> • Seek, analyze and synthesize data • Autonomous work • Team work • Project design and management • Freedom of thought

3. CONTENT

<p>In the context of this course, basic knowledge required for understanding concepts concerning mostly issues of technological nature is given. The course is organised in four thematic units (analysis, algebra, analytic geometry and probabilities-statistics), in which the theoretical approach and presentation of the subjects and the respective mathematical concepts are combined with concrete examples of audiovisual technologies applications (e.g. development of algorithms for interactive audiovisual applications). Special emphasis is placed on the application of mathematical concepts through examples and drills related to sound and image technologies, using the mathematical package Matlab.</p>

1st Week

General introduction to the course. Basic elements of function plots in programming environment.

LAB: Introduction to Octave environment. Running simple programmes for creating the plots of straight lines and parabolas

2nd Week

Functions: limits, continuous functions, derivatives. Basic functions (linear, logarithmic, exponential etc). Even - odd functions, invert function, composite functions.

LAB: Plots of circles in Cartesian and polar coordinates

3rd Week

Calculus. Derivatives - derivatives of basic functions. The derivative of the sum and product of functions. Local minimum and local maximum

LAB:

4th Week

Integrals: Introduction to integrals - antiderivative integral - definite integral. Integrals of basic functions. Trapezium method.

LAB: Plot of the transverse on specific point

5th Week

Integration with substitution - integration by parts. Calculation of the curve length

LAB: Run and analyse the trapezium method on computer

6th Week

Multiple variable functions - partial derivatives.

LAB: Calculation of curve length

7th Week

Chain rule - examples. Vectors - internal product - external product

LAB: Spiral graphics - (2d and 3d)

8th Week

Vector analysis: Vector functions - 2 variable vector functions . Gradient of functions

LAB: Sphere plotting

9th Week

Vertical vector - transverse

LAB:Cone graphic (cylinder)

10th Week

Fourier tranform, Fourier sequence, Fourier integral

LAB: Descrite Fourier transform (FFT)

11th Week

Sequences - Series - definitions, sequence limit - arithmetic and geometric series. Convergent series - divergent series

LAB: Solving 3x3 systems

12th Week

Combinatorics - Probabilities: ordering - permulation. Ordering with repeat. District probability

LAB: Plots of probability functions

13th Week

General overview - past exams exercises

4. TEACHING AND LEARNING METHODS - EVALUATION

TEACHING METHOD	Lectures								
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Enhanced by multimedia content. The learning process is supported by the asynchronous e-learning platform e-class.								
TEACHING STRUCTURE	<table> <tr> <td>Activity</td> <td>Semester Workload</td> </tr> <tr> <td>Lectures</td> <td>26</td> </tr> <tr> <td>Lab Lectures</td> <td>26</td> </tr> <tr> <td>Literature Study and Analysis</td> <td>80</td> </tr> </table>	Activity	Semester Workload	Lectures	26	Lab Lectures	26	Literature Study and Analysis	80
Activity	Semester Workload								
Lectures	26								
Lab Lectures	26								
Literature Study and Analysis	80								

	Practice and Preparation Course Total (ECTS: 7)	43 175
EVALUATION OF STUDENTS	The evaluation is a result of the final written exam.	

5. BIBLIOGRAPHY

Wrede Robert C., Spiegel Murray R. (2015). Ανώτερα Μαθηματικά - Σειρά Schaum

B.S.Grewal (2014). Higher Engineering Mathematics. Khanna Publishers