

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE	311-1250	SEMESTER	H
COURSE TITLE	CODING THEORY		
INSTRUCTOR			
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
	3	4,5	
COURSE TYPE	Specialised general knowledge		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	https://www.math.aegean.gr/index.php/en/education/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
<p>At the end of this course, students should be able to:</p> <ul style="list-style-type: none"> • Define error-detecting and error-correcting codes, explain their significance, construct and evaluate simple examples, such as repetition and parity-check codes. • Define the constants related with the length(n) and the distance(d) of the code, and calculate simple examples. • State and prove bounds on the sizes of codes – in particular, the Hamming and Singleton bounds. • Explain the definition and significance of linear codes. • Define, construct and manipulate generator matrices and parity-check matrices. • Decode linear codes using syndrome decoding. • Explain the relationship between the generator matrix and the corresponding parity-check matrix. • Construct various useful codes such as Golay and MDS codes, understand their properties and handle their decoding processes.
General Competences
Working independently. Team work. Working in an interdisciplinary environment.

(3) SYLLABUS

<p>Introduction to Coding Theory and Source Coding.</p> <p>Review of finite fields and polynomial rings.</p> <p>Linear codes.</p> <p>Dual codes.</p> <p>Hamming codes.</p> <p>Cyclic codes.</p> <p>Perfect codes.</p> <p>BCH codes and Reed-Solomon codes.</p> <p>Convolutional codes and Reed-Muller codes.</p>	
TEACHING MATERIAL DISTRIBUTION	The teaching material of the course is uniformly distributed during the semester.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face lectures	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	<ul style="list-style-type: none">• Communication with students via e-mail.• Uploading course material on moodle system.	
TEACHING METHODS	<i>Activity</i>	<i>Semester workload</i>
	Lectures	39
	Independent Study	73,5
	Course total (25 per ECTS)	112,5
COURSE COMMITMENTS	Attending course is not obligatory	
STUDENT PERFORMANCE EVALUATION	Student's evaluation is done in Greek through a written examination. For students with disabilities, evaluation takes place via oral exams.	

(5) ATTACHED BIBLIOGRAPHY

1. D.R. Hankerson, D.G. Hoffman, D.A. Leonard, C.C. Lindner, K.T. Phelps, C.A. Rodger, J.R. Wall, Coding Theory and Cryptography The Essentials. Second Edition.
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