COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1327	**SEMESTER**	5th
COURSE TITLE	**COMPUTER AIDED GEOMETRIC DESIGN OF MARINE STRUCTURES**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	2	5
Laboratory	2	
Total	4	

COURSE TYPE *general background, specialbackground, specialized, general knowledge, skills development*	Specialized
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA183/

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of the course is to understand modern Computer Aided Design (CAD) technologies and their application to ship design (Computer Aided Ship Design - CASD) and Marine Structures in general. Design technologies are based on geometric models for the representation of curves and surfaces. The knowledge of these models and their respective development/editing procedure is essential in order students to understand how CAD / CASD systems work and how to use them to represent ship's geometry.

Upon successful completion of the course, the students will be able to:

1. Describe geometric properties of spline curves and surfaces (Bezier, B-Splines, NURBS) and calculate points, derivatives and curvatures.
2. Interpolate spline curves through points and spline surfaces through curves for the construction of ship parts and floating structures.
3. Analyze the fairness of curves and surfaces, by means of curvature plots, and impose appropriate corrections to improve it.
4. Design three-dimensional models of ships and floating structures
5. Prepare photorealistic 3D models

(3) COURSE CONTENT / SYLLABUS

Theoretical part

Introduction to CASD systems. Design, construction and analysis using computers. Introduction to Information Technologies in Naval Architecture. Computer generated drawings. Elements of geometric modeling using computers. Geometric transformations. Parametric representation of curves and surfaces. Elements of differential geometry. Bézier, B-Spline and NURBS curves and surfaces. Interpolation and curve fitting. Surface interpolation. Methods of fairing of two-dimensional curves (e.g. stations, waterlines) under design constraints. Methods of fairing three-dimensional curves and surfaces. Parametric computer-aided hull design.

Laboratory Part of the Course

Design and fairing of lines of various types of ships. Training in three-dimensional hull design with specialized software packages (e.g. Rhino3D, Grasshopper).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY Face-to-face, Distance learning, etc.	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	• Use of ICT in teaching. • Use of specialized CAD software (e.g. Rhino3D, Grasshopper) • Support learning through the electronic e-class platform.
TEACHING METHODS *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 PERFORMANCE EVALUATION *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*	Final written examination (60%) on: • questions of theoretical content • solution of computational problems Laboratory part: • Individual 3D design project (e.g. ship hull, interiors, marine structure) using a specialized software package. (25%) • Final examination of the laboratory part which includes 3D design using specialized software package. (15%)

Activity	*Workload (hours)*
Lectures	26
Laboratory exercises	26
Homework assignments	39
Study of Lectures	52
Course total	**143**

(5) ATTACHED BIBLIOGRAPHY

Books

1. Farin, G.E., 2000, “The Essentials of CAGD”. A.K. Peters, Natick, Massachusetts.
2. Farin, G.E., Hoscheck, J., Kim, M.-S., 2002, “Handbook of Computer-Aided Geometric Design”. Elsevier.
3. Letcher, J., 2010, Principles of Naval Architecture Series: The Geometry of Ships. The Society of Naval Architects and Marine Engineers,. ISBN: 9780939773671.
4. Nowacki, H., Bloor, M. I. G., Oleksiewicz, B. Eds, 1995, “Computational Geometry for Ships”. World Scientific.

Journals

1. Computer-Aided Design, ISSN: 0010-4485
2. Computer Aided Geometric Design, ISSN: 0167-8396
3. Computer Methods in Applied Mechanics and Engineering, ISSN: 0045-7825
4. Computer-Aided Design and Applications, ISSN: 1686-4360