COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1224	**SEMESTER**	4th
COURSE TITLE	**MANUFACTURING PROCESSES**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		2	5
Laboratory		2	
Total		4	
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	Special background		
PREREQUISITE COURSES:	NAOME1104		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NAFP123/		

(2) COURSE GOALS / LEARNING OUTCOMES

The aim of this course is to familiarize the students with the basic manufacturing processes and the principles of cutting and forming materials. Emphasis is given both on theoretical and practical issues, such as performing measurements, calculations of material removal conditions and programming of CNC machines. Also, main objective of the course is to practice students to the use of conventional machines (lathe, drill, mill) for the construction of mechanical objects.

Upon successful completion of the course, the student will be able :

- To have the theoretical and practical background concerning the field of manufacturing technology.
- To select the required machines, tools, and materials for the production of a metal component.
- To understand and create the phases to produce a given object performing the necessary calculations for the required manufacturing conditions.
- To operate the lathe machine and other conventional machines (drilling, sawing, milling) to make an object according to a given mechanical drawing.
- To perform measurements of mechanical quantities using measuring instruments.
- To program CNC machines and develop the appropriate G-code for cutting a given object.
- To compare and evaluate modern product production technologies.
- To apply the principles and special regulations of health and safety at work, as required to be applied in mechanical work areas.

(3) COURSE CONTENT / SYLLABUS

Theory lectures:

- Introduction to Integrated Mechanical Product Design (Development - Design - Production - Quality Control).
- The machine shop (structure, operations, facilities, equipment, safety means and hygiene rules).
- Metrology. Statistical Process Control. Measuring instruments. Control and analysis of measuring systems. Errors and uncertainties. Gauges.
- Machining materials. Metalworking.
- Material formation processes (cutting, bending, deep-drawing, forging, drawing, wire-drawing, extrusion, rolling).
- Material removal processes (turning, milling, drilling, reaming, grinding, planning).
- Machine tool operation, cutting conditions and correlation with cutting tools. Cutting forces and power of machine tools. Processing times.
- Characteristics and basic principles of metal cutting (cutting mechanism, chip formation, heat contagion, cutting tools, tool wear, cutting fluids).
- New technologies for cutting materials (Electrical discharge machining, water cutting, plasma cutting, laser cutting).
- Rapid prototyping techniques (Stereolithography, Fused Deposition Modeling, Selective Laser Sintering, Laminated Object Manufacturing, 3D Printing - Binder Jetting).
- Programming of CNC machine tools. Structure and operation of numerical control NC - CNC machine tools.

Laboratory:

- Use of laboratory measuring instruments to determine the geometry of given objects.
- Laboratory exercise on sand casting.
- Laboratory exercise on cold rolling of metal plate.
- Construction of machining process sheets for cutting a shaft with gradations (cutting conditions calculation).
- Laboratory training on shaft cutting on a Maximat V13 lathe.
- Familiarize with cutting tools such as grinder, cutting saw, drills, Bridgeport CNC milling machine.
- Creation of G-code programs for cutting of a cylindrical object on a CNC lathe and cutting of a prismatic object on a CNC milling machine.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT in teaching.
• Laboratory familiarization with measuring instruments, tools and machines.
• Support learning through the electronic e-class platform.</td></tr>
<tr><td>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,</td><td>
<table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lectures</td><td>26</td></tr>
<tr><td>Laboratory practice on machines, tools</td><td>26</td></tr>
<tr><td>Homework exercises</td><td>26</td></tr>
<tr><td>Visit to machine shop</td><td>5</td></tr>
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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*	Group project	13
	Study of Lectures	47
	Course total	***143***
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*	Theory: Written examination (80%) Midterm examination (20%) Laboratory: - Final written examination (50%). - Laboratory examination on the use of cutting machines (50%). The overall grade occurs from the grade of theory (50%) and the grade of laboratory (50%).	

(5) ATTACHED BIBLIOGRAPHY

1. Manufacturing Technology: Materials, Processes, and Equipment, Helmi A. Youssef, Hassan A. El-Hofy, Mahmoud H. Ahmed, 2017, Publisher: CRC Press, ISBN 9781138072138.
2. Manufacturing Engineering Handbook, Second Edition, Hwaiyu Geng, 2015, Publisher: McGraw-Hill Education, ISBN: 9780071839778.
3. Principles of Modern Manufacturing SI Version, Global Edition, Mikell P. Groover, 2016, Publisher: John Wiley & Sons, ISBN: 9781119249122.
4. Handbook of Manufacturing Engineering and Technology [electronic resource], Andrew Y. C. Nee, 2015, ISBN: 9781447146704, HEAL-Link Springer ebooks. Κωδικός Βιβλίου στον Εύδοξο: 73263938.
5. Modern Manufacturing Engineering [electronic resource], J. Paulo Davim, 2015, ISBN: 9783319201528, HEAL-Link Springer ebooks. Κωδικός Βιβλίου στον Εύδοξο: 73265161.