APPLIED MATHEMATICS II

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40201	**SEMESTER**	2nd
COURSE TITLE	APPLIED MATHEMATICS II		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	There are no prerequisite courses.However, students must possess the relevant knowledge of the course Applied Mathematics I.
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	https://eclass.uop.gr/courses/CIVIL114/

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course is a basic Applied Analysis course. It aims to introduce students to basic concepts of Calculus of scalar functions of many variables, as well as vector functions. The knowledge covered is necessary for the course of Differential Equations that is taught in the next semester, but also for many specialty courses of Civil Engineering.

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

- Effectively use Calculus of many variables.
- Do mathematical modeling of various problems of the Civil Engineer, in which concepts of the above sections of Mathematics are used.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Working idependently
- Team work
- Search for, analysis and synthesis of data and information

3. SYLLABUS

1. Curves and surfaces in $\mathbb{R}^2$ and $\mathbb{R}^3$.
2. Scalar functions of many variables: Basic concepts, limits and continuity, partial derivatives, total differential, implicit functions, Taylor expansion, stationary values without and under constraints, multiple integrals.
3. Vector functions: Basic concepts,parametric equations of a curve, gradient, directional derivative, divergence and rotation, line and surface integrals, Green, Gauss and Stokes theorems.

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>Support of the learning process through the 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, 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</td><td><table><tr><th>Activity</th><th>Semester workload</th></tr><tr><td>Lectures</td><td>52</td></tr><tr><td>Final exams</td><td>3</td></tr><tr><td>Personal study</td><td>70</td></tr><tr><td></td><td></td></tr><tr><td>Course total</td><td>125</td></tr></table></td></tr>
<tr><td>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

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Written examination that includes problem solving</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

1. Ν. Μυλωνάς, Χ. Σχοινάς, Γ. Παπασχοινόπουλος, «Λογισμός Συναρτήσεων πολλών Μεταβλητών και Εισαγωγή στις Διαφορικές Εξισώσεις». Εκδόσεις Α. Τζιόλα & Υιοί Α.Ε. (2016).
2. Μ. Φιλιππάκης, «Εφαρμοσμένη Ανάλυση και Θεωρία Fourier». Εκδότης: Τσότρας Α. Αθανάσιος (2017).
3. Θ. Ρασσιάς, «Μαθηματικά ΙΙ». Εκδότης: Τσότρας Α. Αθανάσιος (2017).
4. J. Hass, C. Heil, M. D. Weir, «Thomas Απειροστικός Λογισμός». Πανεπιστημιακές Εκδόσεις Κρήτης (2018).

CONSTRUCTION TECHNOLOGY I

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	BACHELOR		
COURSE CODE	40202	**SEMESTER**	2nd
COURSE TITLE	CONSTRUCTION TECHNOLOGY I		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (ENGLISH)
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Knowledge of the construction of historic buildings by students, so that they are able to recognize historical phases, alterations and damage to structural systems and materials and choose the right restoration methods.

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

- Apply his/her knowledge to building issues of historic constructions.
- Know issues of terminology, historical construction, peculiarities of construction in historic buildings, ways of construction, the behavior of historic buildings.
- Correctly compose construction details (study and implementation) of a historic building.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

……

Others…

…….

Autonomous work

Group work

3. SYLLABUS

Building art in antiquity, in medieval and modern times: Problems of terminology (loans and misinterpretations).

Materials and ways of building (masonry, floors, stairwells, openings, antiseismic care, etc.).

The time course of a building (conversions, additions and their impact on the behavior of the building).

Structural failures, way of destruction.

Constructions of stone, brick, wood, metal, cast and mixed.

Masonry, arches, domes and shells. Wooden building blocks of historic buildings (roofs, floors, stairs, frames).

Morphology and modes of construction.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classroom
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Yes

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

Activity	*Semester workload*
Lectures	25
Practice exercises that focus on the application of methodologies and analysis of studies in smaller groups of students	25
Group work on a study	50

the ECTS		
	Course total	100
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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	i. Written final examination ii. Presentation of group work	

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Μπούρας Χ., Μαθήματα Ιστορίας της Αρχιτεκτονικής, τ. πρώτος, Αθήνα 1999, [ΦΕΚ 478/Τεύχ. Β΄/2005], Εκδόσεις Συμμετρία.

Μπούρας Χ., Ιστορία Αρχιτεκτονικής, Δεύτερος τόμος, Αθήνα 1994, [ΦΕΚ 346/Τεύχ. Β΄/17-3-2005], Εκδόσεις Μέλισσα, ISBN 960-204-0238.

Παπαϊωάννου Κ., Τεχνολογία της Τοιχοποιίας, 1998, Εκδόσεις UNIVERSITY STUDIO PRESS.

Frey H., Οικοδομική Ι, Εκδόσεις ΙΩΝ, ISBN 960-331-210-Χ.

Frey H. κ.ά., Οικοδομική ΙΙ, [ΦΕΚ 403/Τεύχ. Β΄/2003], Εκδόσεις EUROPA/ΙΩΝ, ISBN 960-331-211-8.

Καλογεράς, Θέματα Οικοδομικής ΕΜΠ, 1999, Εκδόσεις Συμμετρία, Κωδ.2000 250 70.

Παπαδόπουλος Μ., Σημειώσεις Οικοδομικής, τ. 1 + συμπλήρωμα, 1979, Εκδόσεις Αφοί Κυριακίδη, ISBN 960-343-100-243.

Mitchell's - Osburn, Οικοδομική, Εκδόσεις ΙΩΝ, ISBN 960-411-322-4.

Neufert E., Οικοδομική, [ΦΕΚ 918/Τεύχ. Β΄/2005], Εκδόσεις Μ. Γκιούρδας, ISBN 965 123975.

Schmitt H., Κτιριακές Κατασκευές, [ΦΕΚ 604/Τεύχ. Β΄/2005], Εκδόσεις Μ. Γκιούρδας.

TECHNICAL DRAWING II – COMPUTER-AIDED DESIGN II

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40203	**SEMESTER**	2nd
COURSE TITLE	TECHNICAL DRAWING II – COMPUTER-AIDED DESIGN II		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures + Drawing Laboratory + Laboratory CAD	2 + 2 + 2 (Total: 6)	2 + 2 + 2 (Total: 6)
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Skills Development Course
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

- Acquisition of Tech. Drawing ability, knowledge of the drawing as a means of expression and communication. Practice reading the plans correctly.
- Gaining the ability to use the technical plans as a guide either to implement the construction it represents, or to study it, or even to control an already completed construction, since the technical plans is a graphic representation of the external form and its internal details.
- Practice so that the technical drawing for the student becomes a key tool for capturing, formulating, editing and realizing an idea.
- Development of the Representative perception of students. Freehand drawing or instruments of isometric and simple perspectives.
- Understanding construction methods and simple construction details.
- Optimize design speed and quality.
- Gaining the ability to design in space (three dimensions), through an Autocad design program. Gaining the ability to handle volumes and surfaces in the space and the position of the commands on the screen, in order to achieve the design in the optimal time. Be able to process their designs at any time, speed up their work through slides and deliver photorealism. Finally, they will be able to print multiple views of 3D designs

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

……

Others…

…….

- Autonomous work
- Project design and management
- Promoting free, creative and inductive thinking

3. SYLLABUS

Technical drawing by hand:

Horizontal section (floor plan), Transverse section, Facades, Complex applications, Isometric floor plan and section

- comparison of axonometry and perspective, Introduction and principles of the Perspective Plan. Outline.

Details: decorative elements, masonry, floors, indoor ground surfaces, openings, roofs, overlays
Ladders (stairs).

Topographic diagrams, Coverage diagrams, Longitudinal profile, Equilibrium curves, Horizontal

Bearing construction plans (formwork) and how to design them. Metal design and wooden constructions.

Applications in infrastructure projects (eg standard road sections on embankments and embankments, mezzanines, pedestals and bridge fences, tunnel sections, etc.). Lab exercises

Computer-aided design:

Axonometric projection. Thickness (Thickness) and Elevation(Elevation) of two-dimensional lines. Hide lines (Hide). Coordinate Systems (UCS). Separation of the screen into view windows (Viewports).

Three-dimensional lines and surfaces (SURFACES). Solid bodies (SOLIDS). Three-dimensional object processing commands. Perspective view of the plan (Dview). Slides, Scripting. Paper space (PAPER SPACE).
Photorealism (RENDER).

Lab exercises

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>Design software: AutoCAD</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, 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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>20</td></tr>
<tr><td>Laboratory exercises (Tech. drawing on drawing/drafting table)</td><td>80</td></tr>
<tr><td>Laboratory exercises (Computer-aided design)</td><td>50</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Course Total
(25 hours of workload per credit unit)</td><td>150</td></tr>
</table>
</td></tr>
<tr><td>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

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Theory
Written final exam (100%) which includes:
- Multiple choice questions
- Short answer questions
- Scale or analog sketch design with simultaneous construction solution.

Laboratory (Technical Drawing on drawing table)

I. With the appropriate questions and answers that given by students during laboratory (10%)
II. By correcting weekly Tech. Drawing Projects (30%)
III. With the semi-annual examination (60%)

Laboratory (Computer-Aided Design)

II. By correcting weekly issues (40%)
III. With the semi-annual examination (60%)</td></tr>
</table>

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

A. Arvaniti - Harokopou (2003), Architectural Drawing, Ion - Code in Eudoxus: 120473

Grigorios Fountas (2001), Building and Architectural Drawing, Grigorios Chrysostomou

Fountas - Code in Eudoxus: 4541

Malikouti Stamatina, (2011), Methodology and Applications of Technical Drawing, Book Code

in Eudoxus 12985431, MODERN PUBLISHING LTD

Giannis T. Kappos (2010), Work with AutoCAD 2011, Key Number - Code in Eudoxus:

48743

Vassilis Kordonias (2007), Creating Models 3D AutoCAD 2008, Key Number - Code in Eudoxus: 13634

Giannis Th. Kappos (2008), 3D Topographic and Architectural Examples in AutoCAD, Key Number - Code in Eudoxus: 13517

TECHNOLOGY OF STRUCTURAL MATERIALS -COMPOSITE MATERIALS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40204	**SEMESTER**	2th
COURSE TITLE	TECHNOLOGY OF STRUCTURAL MATERIALS - COMPOSITE MATERIALS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures Laboratories exercises	4 hours/week 2 hours/week	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	No prerequisite courses are need but the students should attended in previous semesters' courses in Physics and Mathematics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	YES in the Open eClass platform (Asynchronous e Learning platform).

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of this course, the students should be able to comprehend and calculate:

- Design projects related to civil engineering applicals with traditional and advanced building materials
- To be familiar with the basic materials used in construction
- To be able to use new methods of composite materials for the construction of buildings and construction projects e.g. bridges, dams, road construction projects, rail way engineering etc
- To use advances materials for the hirabilitation and reconstruction of builingds and monuments

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others… …….*

.

- Working as a team in projects related to construction engineering
- Creation of new ideas in problems of civil engineering
- Ability to lead the scientific group for the study and construction of small and/or small projects
- Working by himself in engineering projects

3. SYLLABUS

Theory

- Mechanical properties
- Nonmechanical properties
- Production and construction
- Material variability

- Laboratory measuring devices
- Nature of materials
- Basic materials concepts
- Metallic materials
- Inorganic solids
- Organic solids
- Steel: heat treatment of steel, steel alloys, structural steel, reinforcing steel, mechanical testing of steel, welding, steel corrosion
- Aluminum: Aluminum production, aluminum metallurgy, aluminum testing and properties, welding and fastening, corrosion
- Aggregates: Aggregate sources, geological classification, evaluation of aggregate sources, aggregate uses, aggregate properties, handing aggregates
- Portland cement: Portland cement production, chemical composition of Portland cement, finesses of Portland cement, specific gravity of Portland cement, hydration of Portland cement, voids in hydrated cement, types of Portland cement, mixing water, admixtures for concrete
- Portland cement concrete: proportioning of concrete mixes, mixing placing and handling fresh concrete, curing concrete, properties of hardened concrete, testing of hardened concrete, alternatives of conventional concrete
- Masonry: masonry units, mortar, grout, plaster
- Asphalt binders and Asphalt mixtures: types of Asphalt products, uses of Asphalt, temperature susceptibility of Asphalt, chemical properties of Asphalt, superpave and performance grade binders, characterization of Asphalt, classification of Asphalt, Asphaltperformance grade binders, characterization of Asphalt, classification of Asphalt, Asphalt concrete, Asphalt concrete mix design, characterization of Asphalt concrete, Asphalt concrete production, recycling of Asphalt concrete, additives
- Wood: structure of Wood, chemical composition, moisture content, Wood production, lumber grades, defects in lumber, physical properties, mechanical properties, testing to determine mechanical properties, design considerations, organisms and degrade Wood, Wood preservation, engineering Wood products
- Composite materials, microscopic Composites, macroscopic Composites, properties of Composites

Experiments

- Introduction to measuring devices
- Statistical analysis of experimental measurements
- Experiment measuring: of the density of various building materials, determination of the strength of various building materials with super sound technique, determination of the strength of various building materials with vibration technique, determination of thermal expansion coefficient, determination of swelling coefficients for gypsum, experimental evaluation of coagulation point of cement using VICAT method, stiffness of various mines, moisture coefficient of aggregates, penetration of nails in concrete to estimate the strength

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures in the class using the black board and/or computer techniques e.g Power Point with the use of video projector. The Laboratory are taking place at the Strength of Materials Laboratory.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of the Information and Communication Technologies (ICT) in Teaching.Support of the learning process 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*	

Activity	***Semester workload***
Attendance of Lectures (6 hours x 13 weeks)	78
Participation in optional practice exercises that are given in the classroom and focus on Civil Engineering applications	52
Independent Study	74
Course total	*204*
(25 hours workload per credit)	***(6 ECTS x36) = 204***

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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to*	The evaluation is done: • In the theory (70% of the final grade from the final examination, 15% from homework and 15% from midterms) • In the Laboratory (50% from the final exam and 50% from reports concerning the lab exercises)

students.	

5. BIBLIOGRAPHY

- Suggested bibliography:

1. Κακαβάς Π και Λέμης-Πετρόπουλος Π., Τεχνολογία Δομικών Υλικών εκδ Ζήτη, 2008
2. Τριανταφύλλου Αθ., Δομικά Υλικά, 2018
3. Mamlouk M., and Zaniewski J., Materials for Civil and Construction Engineers, Pearson Education ltd, 2006

STRENGTH OF MATERIALS

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40205	**SEMESTER**	2th
COURSE TITLE	STRENGTH OF MATERIALS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures Laboratories exercises	4 hours/week 2 hours/week	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General background
PREREQUISITE COURSES:	No prerequisite courses are need but the students should already have attended in previous semesters' courses in Physics and Mathematics
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (In English)
COURSE WEBSITE (URL)	YES in the Open eClass platform (Asynchronous e Learning platform).

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

Upon successful completion of this course, the students should be able to comprehend and calculate:

- Strength of materilas based on fountamantal principles of stress,strain, Mohr's circle for computation of maximun stress within the materilas
- Design of construction structures bases on the strength of materials
- Dimensionalization of structures in real construction projects

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	……
Production of new research ideas	*Others…* …….

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- Working as a team in projects related to construction engineering
- Creation of new ideas in problems of civil engineering
- Ability to lead the scientific group for the study and construction of small and/or small projects
- Working by himself in engineering projects

3. SYLLABUS

Theory

- Tension: Hooke's law, simple and compound bars, trusses, statically indeterminate truss
- Torsion: Shear stress, solid circular shafts
- Bending: Bending moment diagrams, pure bending stress, shear stress distribution, applications
- Compound stresses: bending and compression, Mohr's circle, bending shear, and torsion, theory of strength

- Deflection of beams: The differential equation of flexure, the “12 23 68” -Myosotis method-, statically indeterminate beams, the area-moment method, variable cross sections-shear deflections
- Special beam problems: Beams of two materials, skew loads, the center of shear, reinforced concrete plastic deformations
- Cylinders and curved bars: riveted thin walled pressure vessels, thick walled cylinders, thin curved bars, thick curved bars
- The energy method: stored elastic energy, the theorem of Castigliano, statically indeterminate systems, Maxwell’s reciprocal theorem
- Buckling: Euler’s column theory, other end conditions, practical column design

Experiments

- Tension of metallic specimens
- Bending of metallic specimens
- Torsion of metallic bars
- Buckling of metallic bars
- Experimental determination of the stiffness of metallic materials (Rockwell and Brinell techniques)
- Fatigue of metallic materials

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures in the class using the black board and/or computer techniques e.gPower Point with the use of video projector. The Laboratory are taking place at the Strength of Materials Laboratory.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of the Information and Communication Technologies (ICT) in Teaching.Support of the learning process 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*	***Activity***	***Semester workload***
	Attendance of Lectures (6 hours x 13 weeks)	78
	Participation in optional practice exercises that are given in the classroom and focus on Civil Engineering applications	52
	Independent Study	74
	Course total	*204*
	(25 hours workload per credit)	***(6 ECTS x36) = 204***
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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The evaluation is done: • In the theory (70% of the final grade from the final examination, 15% from homework and 15% from midterms) • In the Laboratory (50% from the final exam and 50% from reports concerning the lab exercises)	

5. BIBLIOGRAPHY

4. Beer F, Johnson R., Dewolf J and Mazurek D, Mechanics of Materilas, 7th ed., Mc Graw Hill, 2015
5. Τριανταφύλλου Αθ., Μηχανική των Υλικών, 2015
6. Παπαμίχος Ε., και Χαραλαμπάκης Ν., Αντοχή Υλικών και Δομικών Στοιχείων, εκδ Τζιόλα 2017

ARCHITECTURE OF STRUCTURAL FORMS

1. GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	40206	**SEMESTER**	2nd
COURSE TITLE	ARCHITECTURE OF STRUCTURAL FORMS		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	2	3
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Course of general background
PREREQUISITE COURSES:	None
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of this course is:

- ✓ understanding the importance of structural forms
- ✓ understanding how structural forms work
- ✓ understanding of the importance of architectural features, forms and design principals.
- ✓ understanding the three components of an architectural work: function, form, and construction.
- ✓ development of creative thinking.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

Others…

- ✓ Teamwork
- ✓ Derivation of new research ideas
- ✓ Promoting free, creative and inductive thinking

3. SYLLABUS

- ✓ The course will provide students with basic knowledge of structural analysis and design for buildings, bridges and other large structures. The course will emphasize the historical evolution of the structural form and the evolution of structural design knowledge, from the Gothic cathedrals to the suspension bridges.

- ✓ Key concepts (structure, structural system), structural elements, basic types of loads, basic internal loadings, load flow, brief reference to the history of structural systems, historical structural systems (beam on columns), modern structural systems (cable structures, membranes, shells etc.), selection of the structural system/criteria (architectural,economical, etc.), the relationship of architecture with the structural form through examples, timeless approach of the subject.

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*	Support Learning process through electronic platform e-class
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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	The students will be evaluated as follows: • final exam (multiple choice questions, short answer questions) • individual practice tasks • project work (implementing the learning outcomes) which will include the analysis and presentation of an important architectural structure The grade of the final exam will be multiplied by a factor greater than or equal to one depending on the student's performance in the exercises and the project. The maximum value of the factor will be 1.30 for students who will get an A in the exercises and the project.

Activity	***Semester workload***
Lectures	40
Individual practice tasks	10
Project work which will include the analysisand presentation of an important architectural structure.	25
Course total	***75***

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Architectural form and statics: The influence of statics on architectural morphology / Alexandros I. Zannos, by: Alexandros I. Zannos (1928-)
Edition: (1983) (in Greek)

Architecture of structural forms / Angeliki Papalou
Edition: (2011), Publisher: Gotsis Konstantinos & Co.
Book code in Eudoxus: 13255871 (in Greek)

Architecture: Form, space and layout / Francis D. K. Ching
Edition: (1999), Publisher: Stella Parikou & Co OE
Book code in Eudoxus: 14473 (in Greek)

The structural form in architecture / M. Salvatori, R. Heller
Edition: A/1981, Publisher: Danae Kostakioti & Co EE – Culture

The Aesthetics of Architecture by Beton Arme, Panagiotis A. Michelis, Panayiotis Foundation andEfi Micheli, Athens, 1990, Book code in Eudoxus: 50661407 (in Greek)

Koukou, Efthimia N. Architecture of the bridges in terms of morphology and aesthetics (in Greek)