2.6 CE0260 – Descriptive Geometry

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**CE0260**	**SEMESTER**	**2**
COURSE TITLE	**Descriptive Geometry**		

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 Course
PREREQUISITE COURSES:	none
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Offered (English)
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/modules/auth/opencourses.php?fc=69

(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*

After the successful completion of the course, students are expected to:

- Have a basic knowledge and understanding of Geometry, Stereometry and Descriptive Geometry.
- Have a quick perception of three-dimensional space.
- Develop the mental processes of analysis and synthesis concerning the spatial elements.
- Be familiar with the basic spatial elements (point, line, surface) and their manipulation.
- Have a thorough understanding of the concepts of projection and section.
- Have a clear perception of the various methods and techniques of representation.
- Have a basic understanding of computational design in order to represent complex objects using geometric methods.
- Be able to rate, evaluate, analyse and reconstruct the elements of complex problems in order to achieve optimized solutions.

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…*

Specifically, students will be able to perform:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team work
- Creative and design thinking

(3) SYLLABUS

Theoretical part of the Course

1. Elements of Euclidean Geometry and Stereomety, focusing on space and shape relations perception. Types of isometric and non-isometric transformations. Similarity transformations
2. Monge's method of projections. Point, Line and Plane representations. Problems on Lines and Planes. Solid shapes representation. Plane sections of solid shapes. Solid shapes intersections. Solid shapes development.
3. Polyhedra. Symmetries of platonic polyhedra.
4. Representation of curves and curved surfaces in Monge system. Theory of Surfaces. Curves joining. Bezier curves and curve manipulation using control points. Casteljau algorithm. Curved surfaces intersections. Curved surfaces development.
5. Geometric methods of drawing problem solving. Flat shape revolution, change of projection plane, the method of revolution.
6. Shadow projection as an example of line and plane intersection
7. Axonometry of plane and solid shapes
8. Perspective representation of flat and solid shapes. The concept of vanishing points. Spherical perspective elements. Perspective and photography.
9. Stereoscopic vision. References to human stereoscopic vision. Perspective representation using two points of view.
10. The Elevated Projection method. Point and line representation. Plane representation. Problems on lines and planes
11. Space design topics using modern algorithmic design tools.

Laboratory part of the Course

In the laboratory part of the course implementation of the theoretical concepts taught in the theoretical part takes place . The laboratory part contains both practice using the traditional methods and the exploration of geometric concepts using modern digital design tools, so that the student is able to form an overall perception of the available design tools. In any case, either by the traditional methods of drawing by hand and drawing instruments, or by computer, the student implements the concepts which have been taught in the theoretical part. Note that the emphasis is not on learnig a specific computer program but on using computer programs as geometric exploration tools.

(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*	• CAD software for the presentation of complex geometric shapes • Multimedia and interactive presentations of the theoretical part of the course, available also in a website. • Utilization of digital presentation methods in the lectures

<table>
<tr><td></td><td>(Powepoint)
• Utilization of computational programming techniques and software for the presentation of dynamic manipulation of geometric objects
• Utilization of e-class UNIWA platform
• E-mail</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>26</td></tr><tr><td>Laboratory practice exercises</td><td>26</td></tr><tr><td>Theoretical Study</td><td>45</td></tr><tr><td>Teamwork project</td><td>23</td></tr><tr><td>Course total</td><td>175</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>Language of evaluation: Greek

Theoretical part:
Final written examination (problem solving questions, decision making questions): 60%
Progress test: 20%
Teamwork project: 20%

Lab part:
Oral examination of each lab exercise: 50%
Final written examination: 50%</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

Greek Bibliography

1. Koyrniatis N. (2018), *Representation Techniques using Geometric Methods and Modern Digital Tools*, Thessaloniki: Tziolas Publications.
2. Koyrniatis N. (2015), *Geometry and Architecture*, Thessaloniki: Tziolas Publications.
3. Koyrniati A.M., Koyrniatis N. (2012), Perspective in Architectural Representation, Thessaloniki: Tziolas Publications.
4. Lefkaditis G. (2008α), *Elements of Descriptive Geometry*, Volume 2, Athens: self-published.
5. Koyrniatis N. (2018), *Geometric representations in Applied Architectural Design*,Thessaloniki: Tziolas Publications.
6. Koyrniati A.M. – Koyrniatis N. (2012), *Perspective in Architectural Representation*, Θεσσαλονίκη:Thessaloniki: Tziolas Publications.
7. Lefkaditis G. (2006), *Representation Methods*, Athens: self-published.
8. Georgiou D. (2009), *Descriptive Geometry*, Athens: New Technologies editions
9. Ladopoulos P. (1976), *Elements of Descriptive Geometry*, Athens: self-published.
10. Lefkaditis G. (2008β), *Perspective*, Athens: self-published.
11. Malikouti Stam. (2018), TECHNICAL DRAWING – Elements of Theory and Methodology of Applications, Syhroni Ekdotiki: Athens.
12. Malikouti Stam. – Markopoulou Natasa (2017), ARCHITECTURAL DRAWING – Design methodology at the 1:50 scale, Syhroni Ekdotiki: Athens.

Foreign Bibliography

1. Aubert J. (2003), *Dessin d' Architecture: à partir de la Géométrie Descriptive*, Paris: editions de la Villette.
2. Band E. (2011), *Lehrbuch der Darstellende Geometrie*, 2 Bände, Paderborn: Salzwasser Verlag.

3. Faure A. (2009), *Géométrie descriptive: Du point aux surfaces de révolution et aux ombres*, Paris: Ellipses.
4. Gill R. (1975), *Creative Perspective*, London: Thames and Hudson.
5. Hohenberg Fr. (1961), *Konstruktive Geometrie in der Technik*, 2te Auflage, Wien: Springer Verlag.
6. Holiday-Darr K. (1998), *Applied Descriptive Geometry*, 2nd edition, USA: Delmar Publishers.