## 1.1.1 Digital Tools for Design and Construction

### GENERAL

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| **SCHOOL** | Engineering | | |
| **ACADEMIC UNIT** | CIVIL ENGINEERING | | |
| **LEVEL OF STUDIES** | Undergraduate | | |
| **COURSE CODE** | ΔΟΜ029 | **SEMESTER** | 8th |
| **COURSE TITLE** | Digital Tools for Design and Construction | | |

| **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 |
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| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |

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| **COURSE TYPE** *general background, special background, specialised general knowledge, skills development* | Specialization Course |
| **PREREQUISITE COURSES:** | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | No |
| **COURSE WEBSITE (URL)** | https://elearning.cm.ihu.gr |

### 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 completing this course students should be able to work with a range of different software for the creation and constructional support of 3D objects. They should be able to model 3D geometry of a building or smaller structure, to share and transfer information from one software to the other, to select and share information required from other collaborating engineers and to familiarize with the BIM procedures (schedules, cost estimates) that will be required of them to participate in complex buildings.

**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*
*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*

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| *Working in an international environment*<br>*Working in an interdisciplinary environment*<br>*Production of new research ideas* | *Production of free, creative and inductive thinking*<br>*……*<br>*Others…*<br>*…….* |
| 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 | |

**SYLLABUS**

The course aims to introduce students to the creation of 3D geometry and 3D modeling in order to support the construction of buildings. BIM, CAD/CAM technologies, 3D printing and parametric modeling are key concepts that are presented and form the core of the projects handed to students. Special emphasis is placed on the sharing of information and the interoperability between different software. Students work with AutoCAD (3D), Revit and Rhinoceros, enabling them to work with a wide range of 3D modeling tools, depending on the task at hand, indicating the digital expertise needed to collaborate on a multitude of levels with other fields of engineering (geometry clashes, schedules, cost estimates, thermal performance, building maintenance, etc.) according to the project's unique features.

**TEACHING and LEARNING METHODS - EVALUATION**

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| **DELIVERY**<br>*Face-to-face, Distance learning, etc.* | Face to face. |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY**<br>*Use of ICT in teaching, laboratory education, communication with students* | Powerpoint presentations, CAD software (AutoCAD, Revit), parametric modeling software (Rhinoceros), e-learning platform for educational material. |
| **TEACHING METHODS**<br>*The manner and methods of teaching are described in detail.*<br>*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.*<br><br>*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*** |
|---|---|
| Lectures | 20 |
| Project(s) | 30 |
| Project(s) | 40 |
| Individual study | 40 |
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| Course total (26 hours workload per ECTS credit) | ***130*** |

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| **STUDENT PERFORMANCE EVALUATION**<br>*Description of the evaluation procedure*<br><br>*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*<br><br>*Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | - Short examination assignment (30%)<br>- Individual assignment (compulsory) (30%)<br>- Group assignement (compulsory) (40%) |

**ATTACHED BIBLIOGRAPHY**

Veneris, I., “INFORMATICS AND ARCHITECTURE: concepts and technologies”, Tziolas Publications, Thessaloniki, 2011. (In Greek).
Loylakis, Ch., Autodesk Revit Architecture – Learning Guide”, Loulakis Polychronis , 2013.
Aubin, P., Stafford, S., Allen, L.,“The Aubin Academy Revit Architecture: 2016 and beyond”, G3B Press, 2015
Stine, D., J., “Design Integration Using Autodesk Revit 2020”, SDC Publications, 2019)
Kirby, L., Krygiel, E., Kim, M., “Mastering Autodesk Revit 2018”, Sybex; 1st edition, 2017.
Eastman, C, Teicholz, P., Sacks, R., Liston, K., “BIM Handbook: a Guide to Building Information Modeling for Owners, Managers, Designers, Engineer and Contractor”, John Wiley and Sons Ltd, 3d edition, 2018.
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Krygiel, E. Nies, B. “Green BIM: Succesful Sustainable Design with Building Information Modeling”, Sybex; 1 edition, 2008
Woodbury, R., “Elements of Parametric Design”, Routledge, 2010.
Gramazio, F. Kohler, M, Willmann, J., “The Robotic Touch”, Park Books, 2014. https://thebimhub.com/
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