İstanbul Technical University – Department of Architecture

MIM 120E – Introduction to Computational Design Tools and Methods in Architecture, 21949 and 21952

Course Syllabus | 2019-2020 Spring Semester

Course Day and Hour: CRN 21949 Wednesday 9:30-10:30 CRN 21952 Wednesday 10:30-11:30 CRN 21949 Friday 8:30-10:30 CRN 21952 10:30-12:30
Course Room: 229 and BIM I – BIM II
Course Credit: 2
Course Web Site: For CRN 21949 https://ninova.itu.edu.tr/Ders/13084/Sinif/41775 For CRN 21952 https://ninova.itu.edu.tr/Ders/13084/Sinif/41776

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Course Description

This is a compulsory unit of study which aims at introducing students to general principles of computation and its wide range of applications in architectural design. It also aims to introduce the students to the various digital design, fabrication and manufacturing technologies utilized in architectural design practices and make them develop a beginner level knowledge and experience in a suite of these technologies which involve a geometric modelling application (Rhinoceros), together with an parametric modelling plug-in (Grasshopper) and laser cutting as a method for digital fabrication. With these objectives, as can be seen in the weekly plan, the course covers a wide range of topics to be delivered in lecture hours and tutorials and hands on working with Rhinoceros and Grasshopper during the lab hours.

Course Structure and Plan

Weeks	Lectures	Labs
W1	Introduction	Introduction to Rhino Interface I + Assignment Announcement
W2	Overview-history	Introduction to Rhino Interface II
W3	Architectural Geometry	Solid / NURBS Modelling
W4	Design Modelling	Boolean Operations
W5	Parametric Modelling	Introduction to Parametric Modelling
W6	Digital Fabrication	Solid Modelling and Boolean Operations
W7	Digital Manufacturing	Introduction to Fabrication (Laser prep. Unroll + Paneling)
W8	Mid-term break	
W9	Computational Design	Fabrication + Model Development
W10	Algorithmic Thinking in Design	Fabrication + Testing + Development
W11	Computer and Programming Basics	Fabrication + Testing + Development
W12	Modelling, Analysis, Simulation	Midterm Submission (M04) + Instructable Link QR code + Exhibition
W13	Design and Optimization	3D Printing/ CNC Demos
W14	AR/VR/MR	AR/ VR Workshop
W15	Project development	Electronic Prototyping Demos

Recommended Readings

Iwamoto, L. (2009). Digital Fabrications: Architectural and Material Techniques. Princeton Architectural Press, New York.

Pottmann, H., Asperl, A.,Hofer, M. and Kilian, A. (2007). Architectural Geometry. Bentley Institute Press.

Generative Algorithms Using Grasshopper by Zubin Khabazi (http://toi.bk.tudelft.nl/downloads/ar1ae015/Generative_Algorithms.pdf)

Nick Senske's Computational Methods: https://www.youtube.com/playlist?list=PL7255AFE6678ABCB7

http://designalyze.com/software/grasshopper

Download - Rhinoceros : https://www.rhino3d.com/download

Download Grasshopper: http://www.grasshopper3d.com/page/download-1

Apps for Rhino and Grasshopper: http://www.food4rhino.com/

Learn Grasshopper: http://www.grasshopper3d.com/page/tutorials-1

More learning materials can be found online:

Mode Lab – Foundations (https://aae280.files.wordpress.com/2014/10/mode-lab-grasshopper-primer-third-edition.pdf)

http://wiki.bk.tudelft.nl/toi-pedia/Grasshopper

Plethora Project Tutorials (https://www.plethora-project.com/education/2017/5/31/rhino-grasshopper)

Generative Algorithms Using Grasshopper by Zubin Khabazi (http://toi.bk.tudelft.nl/downloads/ar1ae015/Generative_Algorithms.pdf)

Nick Senske's Computational Methods: https://www.youtube.com/playlist?list=PL7255AFE6678ABCB7

http://designalyze.com/software/grasshopper

Grasshopper Basics with David Rutten https://vimeopro.com/rhino/grasshopper-getting-started-by-david-rutten

Essential Mathematics for Computational Design by Rajaa Issa (https://math.okstate.edu/people/segerman/4423/EssentialMathematicsForComputationalDesign_ThirdEdition_rev3.pdf)

https://thinkparametric.com/forum

Grading

1- Mid-term Course Evaluation 50 % of the Course Mark:

- In-Class Assessment 10 %
- Mid-term Assignment 40 % - Submission is in Week 12

2- Final Exam 50 % of the Course Mark

For final exam policy, please also see: http://www.sis.itu.edu.tr/tr/sinav_programi/ekSinavHakkiDuyuru.html The minimum grade to avoid VF and to earn the right to take the Final Exam is to get a grade that is at least 30 % of the Course Mark in the mid-term course evaluation. Also, see the course attendance policy below for additional conditions to avoid VF.

Please note that any late submission of assignments is not accepted and will not be graded.

Assessment Criteria for the Mid-term Assignment:

- Correctness and completeness of the digital model
- Utilization of multiple modeling techniques
- Presentation of the individual process and outcomes
- Submission of the digital files in accord with the requirements listed in the brief
- Utilization of a digital fabrication technique
- Precision, workmanship, and completeness of the physical model

About the Final Exam:

The final exam will cover all the subjects discussed in the lectures during the term.

Communication

Announcements about homework assignments, resources, and exams will be posted on the course website (Ninova). It is the student's responsibility to check the allocated website and personal İTÜ registered email frequently enough to be able to follow the requirements of the announcements in a timely manner.

Plagiarism

University policy prohibits students plagiarising any material under any circumstances. If a student presents the thoughts or works of another as one's own, it is called plagiarism. Plagiarism may include, but is not limited to:
• copying or paraphrasing material from any source without due acknowledgment,
• using another's ideas without due acknowledgment, and
• working with others without instructors' permission and presenting the resulting work as though it was completed individually.
Plagiarism is not only related to written works, but also to material such as data, images, drawings, models, music, formulae, websites, computer programs, and other kinds of intellectual property.
Aiding another student to plagiarize is also a violation of the Plagiarism Policy and may invoke a penalty.

For further information on the University policy on plagiarism, please refer to the University web-site.

Attendance policy

Attendance to all lectures and lab hours is mandatory. Absence in circumstances beyond the student's control is acceptable up to a maximum of 4 lecture days AND 3 lab days respectively. Exceeding any of these limits will result in a VF grade.
The instructors may take attendance at any time during a lecture or a lab session.
Signing in the place of another student is a violation of ethical norms and will not be tolerated.