

Introduction to Digital Design

Course Name	Course type (credit/hours)	Required course(3/3)	Course code	E035
	Target students Division/major/grade	Architecture/Freshman	Opening semester	2021 2ND SEMESTER
	Class time and classroom	Tue 8.5(EC509) Tue 9.5(EC509) Tue 10.5(EC509)	English Grade	A(100%English)
Reference to this course	Prerequisite courses	Fundamental of Architectural Design		
	Related basic courses	Architecture 101		
	Recommended concurrent courses			
	Related advanced courses			

Instructor	Name (title/division)		HWANG YI (Associate Professor, Architecture)		
	Office Room Number	Industrial-Academic Cooperation Center 716	Office phone Number	2493	e-mail
	Office hours	Wed. 11AM-12PM (by appointment only)	Homepage address	https://sites.google.com/view/deers-arch	
Teaching Assistant	Name (title/division)				
	Office Room Number		Office phone Number		e-mail

1. Introduction

Course description

This course introduces college freshmen in architecture to the basic concepts, skills, and theoretical aspects of Computer-Aided Design (CAD) and microcomputer skills/programming (if necessary), leading to a fundamental but thoughtful understanding of building geometry and its digital representation. Topics and tools are specifically geared to the first-year beginners, so they get themselves familiarized with sketching, drawing, modeling, and rendering using digital tools. The course, on the other hand, seeks to engage students in digitally-streamlined processes of building design. Course materials and production focusing on the cutting-edge elements of CAD such as 3D printing or organic modeling will prepare students for upper-level design studios and related classes.

2. Course Objectives

Course objectives and expected outcomes

Contemporary building projects cannot be realized without aids of digital tools; designs and geometry are getting more complex, and construction processes are simulated, automated and controlled with digital, information, and computation technologies. In such a shifting context of architecture, this course encourages to take a technological framework of designing and producing buildings. This course covers basics of 2- and 3- dimensional drafting and modeling of building design with introductory CAD methods for building production. However, rather than promoting architectural tools of representation as willful self-expression, this course aims to enable students to actively employ emerging technologies for design, visualization, and fabrication. Topics are studied by means of manipulative exercises under active guidance and supervision of a lecturer or guests responsible for curriculum and instruction at the Ajou university. Prior to the end of the semester (4-5 week before), a topic of the final design project will be assigned to groups of 2-3 students. Students are required to present their plans and ideas, and tasked with designs and physical productions (3D-printed scale models).

3. Class types and activities

Laboratory. Two days per week, one and one-half hours each. English course
1) Lecture: Slide lectures for the first one and half hours (4:30 ~ 6:00 PM)
2) Recitation: Assignment review and practice for the second one and half hours (6:00 ~ 7:30 PM).

4. Teaching Method

- | | |
|---|---|
| <input checked="" type="checkbox"/> lecture | <input checked="" type="checkbox"/> discussion and debate |
| <input checked="" type="checkbox"/> team project(presentation and case studies) | <input checked="" type="checkbox"/> experiments(role-playing,etc) |
| <input checked="" type="checkbox"/> designing and production | <input type="checkbox"/> on-site learning(on-site training) |
| <input type="checkbox"/> others | |

5. Support Systems in Use

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|--|--|---|
| <input checked="" type="checkbox"/> AjouBb | <input checked="" type="checkbox"/> automatic recording system | <input type="checkbox"/> web-based assignment |
| <input checked="" type="checkbox"/> cyber lecture | <input checked="" type="checkbox"/> online content | |
| <input type="checkbox"/> class behavior analyzing system | <input type="checkbox"/> others | |

6. Teaching Tools

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|---|--|--|
| <input checked="" type="checkbox"/> PBL(Problem Based Learning) | <input checked="" type="checkbox"/> CBL(Case Based Learning) | <input checked="" type="checkbox"/> TBL(Team Based Learning) |
| <input type="checkbox"/> UR(Undergraduate Research) | <input type="checkbox"/> FL(Flipped Learning) | <input type="checkbox"/> DSAL(Data Science Active Learning) |
| <input type="checkbox"/> others | | |

7. Knowledge and ability required for taking this course

No prior knowledge is required, but ability to communicate and understand in English is necessary. Basic computer skills will be helpful.

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		25%	Attendance, integrity in class, and team collaboration
midterm exam			
final exam			
quiz			
presentation		30%	Productivity and quality of the final project (plan, concepts, studies, design, and 3D printed models)
discussion			
homework		45%	In-class Exercises: Proficiency in digital techniques (digital/physical models, drawings, and renderings)
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Ref.	Siteless: 1001 Building Forms	Blanciak, F	MIT Press	2008
Ref.	Digital Architecture: New Applications	Kottas, D.	LINKS	2013
Ref.	Simulations: Modeling, Measuring, and Disrupting Design	TAD (Technology, Architecture + Design)	Taylor & Francis Group	2017
Ref.	Hybrid metaheuristic experiments of real-time adaptive optimization of parametric shading design through remote data transfer	Yi, H.	WSC Conference	2017
Ref.(web)	Top 20: Most Popular 3D Modeling & Design Software for 3D Printing (https://i.materialise.com/blog/en/top-25-most-popular-3d-modeling-design-software)	Fabian	Web	2017
Ref.	TEACHING VISUAL SCRIPTING IN BIM: A CASE STUDY USING A PANEL CONTROLLED BY SOLAR ANGLES	Karen, M.	Journal of Green Building	
Ref.(web)	https://www.autodesk.com/education/free-software/featured		Autodesk	
Ref.(web)	https://www.sketchup.com/products/sketchup-free		SketchUp	
Ref.(web)	https://lumion.com/ ; Lumion-Sketchup Linkage: https://lumion.com/sketchup-exporters.html		Lumion	
Ref.(web)	https://www.rhino3d.com/kr/		Rhinoceros	
Ref.(web)	http://www.meshmixer.com/		Meshmixer	

10. Class system and Class shedule

Course format

Students and the instructor meet once a week, three hours. For the first one and half hours (1.5 hours), lectures are given. Recitation (practical self-training) is continued afterwards for the rest 1.5 hours. Class lecture slides help students learn how to use, draw, and take advantage of different digital tools. At the end of a lecture each week, an exercise will be given. During recitation following the lecture, students undertake a series of closely controlled exercises dealing with combining the elements, then designing within the scope of given tasks. Accordingly, self management, communication, presentation skills are regarded important. Each recitation as well as a lecture is followed by a Q&A session. Lectures are often given as a form of workshop or seminar, and especially, a 3D printing workshop maybe taken under cooperative arrangement with Makerspace at AJOU.

The course is offered in 100% English to prepare students for rapidly globalized education and job markets in the architecture, construction, and engineering (ACE) industry. This language requirement is not to pressurize students but part of course training, as most of the software menus and programming interfaces are written in English. All the students shall use English as a primary language within the classroom. It may be allowed for students to ask/answer questions in Korean, just in case to aid their understanding. However, in principle, Korean takes the secondary role in learning and communication.

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction of the main topics of the course: Orientation to recitation and exercises: tool installation; student grouping (if necessary)	E	HWANG YI	Slide lecture		
2	Basics of digital drawing: 2D (AutoCAD)	E	HWANG YI		In-class Exercise 1	
3	Basics of digital drawing: 2D (AutoCAD)	E	HWANG YI		In-class Exercise 2	
4	No lecture (Thanksgiving)-Exercise 2 (CONT.)	E	HWANG YI			
5	Basics of digital drawing: 3D (Sketchup)	E	HWANG YI		In-class Exercise 3	
6	No lecture (Hangul day), Sketchup modeling	E	HWANG YI		In-class Exercise 4	
7	Rendering and digital presentation: Sketchup, Lumion	E	HWANG YI		In-class Exercise 5	
8	Rendering and digital presentation: Lumion with Sketchup	E	HWANG YI		In-class Exercise 6	
9	Understanding of digital geometry (polygon, NURBS, mesh): Rhino	E	HWANG YI		In-class Exercise 7	
10	Advanced 3D modeling: Rhino	E	HWANG YI		In-class Exercise 8	

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
11	Design for production: Introduction to 3D printing and the final project	E	HWANG YI			
12	Design for production: Fusion 360 (Basics)	E	HWANG YI		In-class Exercise 9	
13	Design for production: Fusion 360 and Mesh mixer (Organic modeling)	E	HWANG YI		In-class Exercise 10	
14	Presentation of project plans, 3D printed work	E	HWANG YI			
15	Presentation of project plans, 3D printed work	E	HWANG YI			
16	Final week (♣ Final Team project presentation)	E	HWANG YI			

11. Other items of notification

Due to the COVID-19 Pandemic, this course will be formatted 100% online.
Online classes will use Zoom and Ajou BB to assist students' learning.