

西安交通大学

《数字空间表现基础》课程教学大纲

一、课程基本信息

I. Basic Information

课程名称 Course Title	数字空间表现基础 Digiskills on Fundamentals of space representation in digital environment		
课程编号 Course Number	ARCH400331		
课程学分 Credits	2	总学时 Credit Hours	32
学时分配 Assignment of Credit Hours	理论: <u>22</u> 实验: <u>11</u> 上机: <u>/</u> 课外: <u>/</u> (课外学时不计入总学时) Lecture: <u>22</u> Studio: <u>11</u> Practice in the IT room: <u>/</u> Extracurricular: <u>/</u> (Extracurricular hours do not count towards the total number of hours.)		
课程类型 Course Type	<input type="checkbox"/> 公共课程 Public Course <input type="checkbox"/> 通识课程 General Education Course <input type="checkbox"/> 学科门类基础课 <input type="checkbox"/> 专业大类基础课 <input checked="" type="checkbox"/> 专业核心课 Specialized Core Course <input type="checkbox"/> 专业选修课 Specialized Elective Course <input type="checkbox"/> 集中实践 Intensive Practice		
开课学期 Semester	<input type="checkbox"/> 1-1 <input checked="" type="checkbox"/> -2 <input type="checkbox"/> 2-1 <input type="checkbox"/> 2-2 <input type="checkbox"/> 3-1 <input type="checkbox"/> 3-2		

	□4-1 □4-2 □5-1 □5-2
先修课程 Prerequisites	n/a
教材、参考书 及其他资料 Materials (Textbook, Bibliography or Referencing and Supplementary Materials)	<p>参考书 Bibliographies:</p> <p>M. Hemmerling, L. Cocchiarella (eds.), <i>Informed Architecture Computational Strategies in Architectural Design</i>, Springer, 2018.</p> <p>M. Hemmerling, A. Tiggemann, <i>Digital Design Manual</i>, DOM Publisher, 2011.</p> <p>M. Hemmerling, M. Graf, <i>Case Study Houses - Digitally Remastered</i>, Spurbuchverlag, 2016.</p> <p>Links to specific video tutorials will be provided during the course.</p>

二、课程目标及学生应达到的能力

II. Course Objectives and Expected Learning Outcomes

(工科专业对标工程教育认证标准中专业毕业要求的 12 条具体指标点，其他专业对标行业/评估标准中专业毕业要求的具体指标点)

The digi skills program for the bachelor course in architecture design focuses on the fundamentals of 3D digital modelling, aiming at providing targeted knowledge and skills for the curriculum in architectural design. It also offers basic guidelines for parametric and bim modelling, which will be better addressed in the future educational path. In line with the spatial approach addressed in our architectural curriculum, geometrical modelling

oriented to architectural space interpretation and configuration will be a relevant educational goal to achieve, together with the control of the nexus between space modelling and space visualization. Summing up:

1_3D Geometrical Modeling

2_3D Architectural Modeling

3_Graphic editing

4_Advances (one or more, according to class reactions): intro to parametric and bim modeling, data acquisition, 3D prototyping

课程目标与专业毕业要求的关联关系

Correlation between course objectives and graduation requirements
for the program

毕业要求：

Graduation Requirements

Students of this major should meet the following graduation requirements in terms of knowledge, ability and calibre.

A. Possess broad theoretical knowledge of humanities and social sciences and natural sciences, strong scientific literacy, humanistic and artistic dispositions, and sound physical and mental well-being.

B. Have solid theoretical knowledge related to architecture, master the basic principles of architectural design, history and theory of architecture, architecture and behaviour, the safety of architecture, building structure,

building materials and construction, control of the physical environment of buildings, urban and rural planning and landscape design, economy and regulations, systems and professional codes, responsibilities of architects and other related knowledge.

C. Have the methods and skills of architectural design and related planning design, master the process and methods of architectural design and have a strong ability to express and practice architectural design, as well as good creative thinking and artistic creation ability and the ability to analyze problems and solve them comprehensively.

D. Have an international open vision and the ability to communicate, compete and cooperate across cultures.

毕业要求 课程目标	A	B	C	D
1	M	M	H	M-H
2	M	M	H	M-H
3	M	M	H	M-H
4	M	M	H	M-H

注：毕业要求中 A、B、C、D、E、F、G、…对应毕业要求中各项具体内容。课程目标与专业毕业要求的关联关系用 H/M/L 标注。

Note: A, B, C and D indicate the specific aspects of the graduation requirements. H, M and L refer to a strong, medium and weak correlation between the course objectives to the graduation requirements respectively.

三、教学内容简介

III. Description of teaching contents

章节顺序	章节名称	知识点	参考学时
	Chapter Title	Teaching Points	Credit Hours
1	3D Modelling	<p><i>Working space: settings / visualization / browsing</i></p> <p>Graphic interface and tools Managing properties Visualization styles</p> <p><i>Geometrical modelling: objects creation / transformations / composition</i></p> <p>Working planes Main primitives Key classic surfaces Introduction to NURBS Meshes Offset surfaces Topographic surfaces Objects transformations and composition Visualizing surfaces</p> <p><i>Graphic modelling: rendering</i></p> <p>Setting and managing material properties Setting and managing lights Setting a scene Visualizing a scene</p> <p><i>Visualization: optical and projective parameters</i></p> <p>Managing projective forms Direction and viewing point control Controlling camera and optical parameters Panorama Animation on path</p>	40 % (note: point 1 is about fundamentals knowledge and skills, strictly linked to point 5)
2	Graphic editing	<p><i>Printing process</i></p> <p>Graphic editing of images Scaling and graphic composition Setting and managing printing layout</p>	10% (basic)
3	Addendum	<p><i>Towards advanced modelling: preparatory notions</i></p> <p>Notes on Importing Cartography and Point Clouds Rhinoceros &</p>	10% (basic)

		Grasshopper Rhinoceros & Revit Notes on CNC and FDM prototyping.	
4	Operating system	An updated release of Windows is required, to be installed on pc or in a partition on Apple computers; the software program used will be Rhinoceros, as a performing modeller; other software programs will be eventually mentioned during the course activities.	10% (basic)
5	Skill test	In order to connect the course activities in a unitary process, the annual theme will consist of modelling, visualizing and prototyping a <i>test scene</i> , with a small pavilion with furniture, located in its narrow urban context (i.e. small urban space between two buildings fronts). Preparatory exercises concerning the modelling of classical surfaces and nurbs will be provided.	30% (application strictly linked to point 1)

四、教学安排详表

IV. Teaching Arrangements

序号	教学内容 Teaching contents	学时分配 Credit Hours	教学方式 Teaching Methods	教学要求 (知识要求及能力要求) Learning Objectives (knowledge objective & ability objective)	对课程目标的支撑关系 Related to which Course Objective
1	3D geometrical and architectural modeling	40%	Interaction: real-time lecture and applications	<p><i>Geometrical modelling</i></p> <p>1. Ka: geometry of spatial structures, form generation, form editing, visualization control</p> <p>2. Ao: customized use of the CAD environment, digital 3D elaboration processes</p> <p><i>Architectural modeling</i></p> <p>3. Ka: geometry of architectural spaces, architectural form</p>	All

				generation, architectural form editing, visualization control 4. Ao: customized use of the CAD environment, digital 3D elaboration processes in relation to architectural design	
2	Graphic editing	10%	Interaction: real-time lecture and applications	1. Ka: architectural iconography, architectural graphics language 2. Ao: model presentation, layouting, scaling, graphic features, setting files to print	All
3	Advances	10%	Lecture, with prospective test applications	1. Ka: architectural modeling in the field of digital graphics 2. Ao: basics of data acquisition and 3D prototyping	All
4	Operating system	10%	Interaction: real-time instructions and applications	1. Ka: issues about computer configuration, software installation, and devices 2. Ao: installing and optimizing software and device performance	All
5	Skill test	30%	Targeted guided exercises related to the contents of the course	1. Ka: digital graphics in architectural design processes 2. Ao: test will focus on the ability to apply knowledge and skills through the development of an assigned small architectural model, located in an assigned small urban context	All

注：对课程目标的支撑关系可填写大纲中第二部分课程目标的相应序号。

The column *Related to which Course Objective* can be filled in with the number of the corresponding course objective in Part II.

五、实践环节

V. Studio/Lab

实验编号 No.	实验名称 Subject Name	实验内容 Contents	教学方法 Teaching Methods	对课程目标的支撑关系 Related to which Course Objective
1	3D Architectural and Urban Modeling	Developing a 3D CAD model of the assigned topic, simulating the use of digital graphics in a simple architectural design process	Guided exercises based on 3D base-files prepared by the teacher	5 (note: although this course is not a Studio, interactive class exercise will take place not only in relation to the Course Objective 5, but also in relation to Course Objectives 1 to 4)

注：对课程目标的支撑关系可填写大纲中第二部分课程目标的相应序号

The column *Related to which Course Objective* can be filled in with the number of the corresponding course objective in Part II.

六、课外学时分配

VI. Extracurricular Practice

章节顺序	内容 Contents	参考学时 Credit Hours	对课程目标的支撑关系 Related to which Course Objective
1	n/a	n/a	n/a
...			

注：对课程目标的支撑关系可填写大纲中第二部分课程目标的相应序号。

The column *Related to which Course Objective* can be filled in with the number of the corresponding course objective in Part II.

七、考核方式及成绩构成

VII. Evaluation and Composition of Grades

Students will be evaluated on the base of an Oral Exam. Students will discuss original 3D models, graphic boards, and written reports developed during the semester, and uploaded in due time according to teacher instructions.

大纲制定者: Luigi Cocchiarella

大纲审核者: _____

最后修订时间: _____年____月____日