

# 西安交通大学《概念表达技法Ⅱ》课程教学大纲

## 一、课程基本信息

课程名称	概念表达技法Ⅱ		
	Concept visualization tools II		
课程编号			
课程学分	2.5	总学时	56
学时分配	实验:32		
课程类型	<input type="checkbox"/> 公共课程 <input type="checkbox"/> 通识课程 <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 <input type="checkbox"/> 专业选修课 <input type="checkbox"/> 集中实践		
开课学期	<input type="checkbox"/> 1-1 <input checked="" type="checkbox"/> 1-2 <input type="checkbox"/> 2-1 <input type="checkbox"/> 2-2 <input type="checkbox"/> 3-1 <input type="checkbox"/> 3-2 <input type="checkbox"/> 4-1 <input type="checkbox"/> 4-2 <input type="checkbox"/> 5-1 <input type="checkbox"/> 5-2		
先修课程 Prerequisite Courses	概念表达技法 I Concept visualization tools I 机械制图 Engineering Drawing		
教材、参考 书及其他 资料	参考书 Bibliographies: [1] Hughes J.F., van Dam A., McGuire M., Sklar D.F., Foley J.D., Feiner S.K., Akeley K., Computer Graphics: principles and practice (3rd ed.), Addison-Wesley Professional, 2009.		

二、课程目标及学生应达到的能力（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）

## II Course Objectives

By the end of the lessons, students will be able to:

1. Describe and explain the most important steps of the graphics pipeline process.
2. Understand the different representation methodologies to lead to the clear and full transmission of all the information necessary for the understanding of the project.
3. Manipulate the product image to align with the target scenario, user, and/or company.
4. Apply digital rendering methods and techniques to describe the final product image.

### 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：

Students of this program should meet the following graduation requirements:

A.Master extensive theories on engineering and technology, humanities, social sciences, natural sciences, etc, demonstrate high scientific literacy, strong humanistic and artistic dispositions, and physical and mental wellbeing;

B.Have solid theoretical knowledge of industrial design, and master the knowledge related to product and its development, design, aesthetics, engineering, technology, management, planning, teamwork, professional ethics, etc.;

C.Master methods and skills of industrial design and related fields, be able to apply multidisciplinary knowledge into reality, and have strong expression, creation, practical, problem analysis and solving skills in the field of design;

D.Have good communication skills, teamwork spirit, a strong sense of social responsibility, and international vision, and be capable of applying interdisciplinary knowledge in pioneering work.

毕业要求	A	B	C	D
课程目标				

1	H	M	M	L
2	M	H	M	L
3	M	M	H	L
4	M	M	H	L

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；H、M、L 分别表示该课程目标对毕业要求相关项的强、中、弱程度。

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 of the course objectives to the graduation requirements respectively.

### 三、教学内容简介

#### Description of teaching contents

章节顺序	章节名称 Chapter Title	知识点 Teaching Points	参考学时 Credit Hours
1	The digital image	<ol style="list-style-type: none"> <li>1. Difference between bitmap and vector images</li> <li>2. Bitmap image characteristics (dimension, resolution, colour depth, compression).</li> <li>3. Outlines of colour theory.</li> <li>4. Outlines of physiology and anatomy of vision.</li> </ol>	8
2	渲染管线 The graphics pipeline process	<ol style="list-style-type: none"> <li>1. The three stages of the pipeline: application, geometry and rasterizer.</li> <li>2. Geometry stage: transformations, camera definition, visual pyramid and clipping planes.</li> <li>3. Rasterizer stage: scan-conversion, shading, z-buffering, double - buffering</li> </ol>	10

3	Lighting phase	<ol style="list-style-type: none"> <li>1. Outlines of light physics</li> <li>2. Light-matter interaction</li> <li>3. Local and global illumination algorithms</li> <li>4. Notes on shadow theory</li> <li>5. Ideal and real light sources</li> </ol>	10
4	Texturing phase	<ol style="list-style-type: none"> <li>1. Bitmap texture</li> <li>2. 2D and 3D procedural textures</li> <li>3. Texture mapping</li> <li>4. Texture channels</li> <li>5. Layered materials</li> </ol>	18
5	Rendering	<ol style="list-style-type: none"> <li>1. File output</li> <li>2. Calculation optimization</li> <li>3. Image manipulation</li> <li>4. Image composition</li> </ol>	10

#### 四、教学安排详表

##### Teaching Arrangements

序号 Teaching contents	学时 分配 Cred it Hou rs	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 The digital image	8	Theory & Practices	<ol style="list-style-type: none"> <li>1. To describe and explain the differences between bitmap and vector images</li> <li>2. To choose the images to be used congruently with the purpose of use</li> <li>3. To produce images consistent with the context</li> </ol>	2, 3
2 The graphics pipeline process	10	Theory & Practices	<ol style="list-style-type: none"> <li>1. To describe and explain the process of transforming a 3D model into a 2D image</li> <li>2. To manipulate the parameters of the render sw to achieve the desired result</li> </ol>	1, 4
3 Lighting phase	10	Theory & Practices	<ol style="list-style-type: none"> <li>1. To recognize and know how to apply different lighting methods in a scene</li> <li>2. To manipulate the parameters of the lighting to achieve the desired result</li> </ol>	1, 3

4	Texturing phase	18	Theory & Practices	<ol style="list-style-type: none"> <li>1. To choose the most suitable textures depending on the image to be produced</li> <li>2. To manipulate the parameters of the texturing to achieve the desired result</li> </ol>	1, 4
5	Rendering	10	Theory & Practices	<ol style="list-style-type: none"> <li>1. To optimize the rendering process</li> <li>2. To manipulate images to create efficient product communication</li> </ol>	2, 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.

## 七、考核方式及成绩构成 Evaluation and Composition of Grades

This course includes multichoice test on theoretical aspects and practice tests: 20 % for ongoing assignments, 25 % for mid-term practical test, 25 % for final practical test, and 30 % for final theoretical test.

〈本部分构成及考试方式可根据具体课程定制〉 Depending on the

course

大纲制定者：\_\_\_\_\_

大纲审核者：××××

最后修订时间：年月日