研究生课程教学大纲（Syllabus）

<table>
<tr><td>课程代码
Course Code</td><td>ME6181</td><td>*学时
Teaching Hours</td><td>48</td><td>*学分
Credits</td><td>3</td></tr>
<tr><td rowspan="2">*课程名称
Course Name</td><td colspan="5">（中文）高等计算机图形学</td></tr>
<tr><td colspan="5">（English）Advanced Computer Graphics</td></tr>
<tr><td>*授课语言
Instruction Language</td><td colspan="5">英文
English</td></tr>
<tr><td>*开课院系
School</td><td colspan="5">机械与动力工程学院
School of Mechanical Engineering</td></tr>
<tr><td>先修课程
Prerequisite</td><td colspan="5">线性代数、C 语言程序设计
Linear Algebra, C Programming</td></tr>
<tr><td rowspan="3">授课教师
Instructors</td><td>姓名 Name</td><td>职称 Title</td><td colspan="2">单位 Department</td><td>联系方式 E-mail</td></tr>
<tr><td>杨培中
Peizhong Yang</td><td>教授
Professor</td><td colspan="2">机械与动力工程学院
School of Mechanical Engineering</td><td>pzyang@sjtu.edu.cn</td></tr>
<tr><td>韦向植
Xiangzhi Wei</td><td>讲师
Assistant Professor</td><td colspan="2">机械与动力工程学院
School of Mechanical Engineering</td><td>antonwei@sjtu.edu.cn</td></tr>
<tr><td>*课程简介（中文）Course Description</td><td colspan="5">计算机图形学是研究用计算机及其图形设备来输入、表示、变换、运算和输出图形的原理、算法及系统。 本课程是一门专业基础课，是理论与实践并重的课程。本课程介绍计算机图形学的基本原理以及交互式图形系统的设计方法。通过本课程的学习，使学生掌握计算机图形学的基本概念、原理以及交互式图形系统的实现技术与工程应用能力。
本课程既注重计算机图形学基础理论知识的传授，又注重计算机图形学工程应用能力的培养。其教学目标为：
1. 掌握计算机图形学基本算法，培养编程实现能力；
2. 掌握曲线曲面生成方法，培养自由造型能力；
3. 掌握几何造型方法，培养三维造型能力；
4. 掌握图形图像处理基本方法；
5. 培养查阅文献、自主学习与研究的能力；
6. 提高理论与实践相结合的重要素质。</td></tr>
<tr><td>*课程简介（English）Course Description</td><td colspan="5">Computer Graphics (CG) is the art or science of input, representation, transformation, operation and output of graphics with the aid of computer and its peripheral equipment. This course is a fundamental professional course, emphasizing on both theory and practice. It introduces the basics of CG and the design method of interactive graphical system. The objective is to let the student have the basic concepts and principles of CG, the implementation method of interactive graphical system, and</td></tr>
</table>

<table>
<tr><td></td><td colspan="4">the application techniques in engineering.
This course puts much emphasis on the fundamental theory of Computer Graphics as well as the application of CG theory into engineering practice. The course outcomes are as follows.
1. Demonstrate the basic algorithms in Computer Graphics, developing programming skills.
2. Demonstrate the generating method for curves and surfaces, developing the free-form modeling ability.
3. Demonstrate the geometric modeling method, developing the 3D modeling ability.
4. Demonstrate the basic techniques of graphics and images.
5. Develop the ability of literature reviewing, active learning and studying.
6. Develop the quality of combining the theory and the practice.</td></tr>
<tr><td rowspan="3">*教学安排
Schedules</td><td>教学内容 Content</td><td>授课学时
Hours</td><td>教学方式
Format</td><td>授课教师
Instructor</td></tr>
<tr><td>计算机图形学简介：计算机图形学的发展、应用和主要研究内容
Introduction of Computer Graphics：
The basic knowledge of the development, application and research area of CG</td><td>2</td><td>课堂教学
Lecture</td><td></td></tr>
<tr><td>基本算法：包括 Bresenham 画线算法、多边形填充算法、Sutherland 裁剪算法等。
The basic graphics algorithm：
Demonstrate the basic algorithms, including Bresenham algorithm for line, hatching algorithm for polygon, Sutherland algorithm for line trimming</td><td>14</td><td>课堂教学
Lecture</td><td></td></tr>
</table>

	曲线和曲面：了解曲线、曲面的常用表示方法，以及参数表示的优点；掌握拟合、插值、样条、光顺、GC 和 C 连续、曲线的曲率与挠率、曲面的法向等基本概念；掌握 Hermite、Bezier、B 样条、NURBS 曲线的生成方法和性质；掌握 COONS、Bezier、B 样条、NURBS 曲面的生成方法和性质；了解基本的二次曲面。 Curves and Surfaces: Demonstrate the basic concepts: fit, interpolation and C or GC continuity. Know the generating method and property of Hermite curve, Bezier curve, B spline curve, NURBS curve, Bezier surface, B spline surface, NURBS surface and conicoid.	12	课堂教学 Lecture	
	三维几何造型：掌握基本的三维造型方法，包括线框模型、曲面模型、实体模型以及分形造型等。 3D geometric modeling： Wireframe modeling, Surface modeling, Solid modeling and Fractal modeling.	12	课堂教学 Lecture	
	图形图像处理：掌握齐次坐标以及基本的二维和三维图形变换；掌握复合变换；掌握投影变换等。掌握基本的消除隐藏线、消除隐藏面方法；了解明暗效应、颜色模型、表面纹理以及科学计算可视化。 Technology of Graphics and images： Uniform coordination, Basic 2D and 3D transformations as well as th composite transformations, Projection transformations. Know the hiding technique, light and shade effect, color model, surface texture and visualization of scientific computation.	8	课堂教学 Lecture	
*考核方式 Grading Policy	平时作业 30 分 课程设计 40 分			

	期末考试 30 分 Homework: 30 points Course Design: 40 points Final Exam: 30 points
*教材或参考资料 Textbooks & References	孙家广等，计算机图形学，清华大学出版社 Sun Jiaguang, Computer Graphics, Tsinghua University Press. James D. Foley,Andries Van Dam,Steven K. Feiner,John F. Hughes,Richard L. Phillips, Introduction to Computer Graphics, Addison-Wesley Educational Publishers Inc. Interactive Computer Graphics A Top-Down Approach with OpenGL Edward Angel and Dave Shreiner Sixth Edition, Addison-Wesley 2012.
备注 Notes	

备注说明：

1．带*内容为必填项；

2．课程简介字数为 300-500 字；教学内容、进度安排等以表述清楚教学安排为宜，字数不限。