

## 课程详述

### COURSE SPECIFICATION

以下课程信息可能根据实际授课需要或在课程检讨之后产生变动。如对课程有任何疑问，请联系授课教师。

The course information as follows may be subject to change, either during the session because of unforeseen circumstances, or following review of the course at the end of the session. Queries about the course should be directed to the course instructor.

1.	<b>课程名称 Course Title</b>	CAD 与工程制图 CAD and Engineering Drawing
2.	<b>授课院系 Originating Department</b>	机械与能源工程系 Department of Mechanical and Energy Engineering
3.	<b>课程编号 Course Code</b>	ME102
4.	<b>课程学分 Credit Value</b>	3
5.	<b>课程类别 Course Type</b>	专业基础课 Major Foundational Courses
6.	<b>授课学期 Semester</b>	春季 Spring / 夏季 Summer / 秋季 Fall
7.	<b>授课语言 Teaching Language</b>	英文 English / 中英双语 English & Chinese
8.	<b>授课教师、所属学系、联系方式 (如属团队授课, 请列明其他授课教师) Instructor(s), Affiliation &amp; Contact (For team teaching, please list all instructors)</b>	魏艳 南方科技大学 机械与能源工程系 Department of Mechanical and Energy Engineering
9.	<b>实验员/助教、所属学系、联系方式 Tutor/TA(s), Contact</b>	助教联系方式 Please list all Tutor/TA(s) 刘芳 liuf3@mail.sustech.edu.cn
10.	<b>选课人数限额(可不填) Maximum Enrolment (Optional)</b>	

11. 授课方式 Delivery Method	讲授	习题/辅导/讨论	实验/实习	其它(请具体注明)	总学时
	Lectures	Tutorials	Lab/Practical	Other (Please specify)	Total
学时数 Credit Hours	24		48		72
12. 先修课程、其它学习要求 Pre-requisites or Other Academic Requirements	无 No.				
13. 后续课程、其它学习规划 Courses for which this course is a pre-requisite					
14. 其它要求修读本课程的学系 Cross-listing Dept.					

### 教学大纲及教学日历 SYLLABUS

#### 15. 教学目标 Course Objectives

本课程是一门既有系统理论又有较强实践性的技术基础课，旨在让学生学习用图形进行工程表达。除了学习工程图学基本概念、投影基本理论以及行业标准外，本课程也专注于培养学生掌握工程设计交流中所涉及的手绘概念图、二维工程图绘制和三维建模技能，为学习后续课程以及完成课程设计和毕业设计打下良好的基础。

The course is designed for students to learn the technique and standard practices of engineering graphics. Besides learning basic concepts, fundamental principles, graphics conventions, and industrial standards, emphases are on developing hands-on sketching skills as well as on gaining exposure to 3-D solid modelling strategies and their applications in technical design communication.

#### 16. 预达学习成果 Learning Outcomes

通过本课程的学习，学习能够掌握以下技能：

- 掌握正投影理论，能够阅读和绘制正投影图、轴测图、剖面图以及断面图。培养使用投影的方法表达三维空间形体的能力；
- 了解机械制图国标基本规定，掌握二维几何图形的绘制方法；
- 掌握手绘概念图的基本方法；
- 熟练使用制图软件（AutoCAD 和 Solidworks）绘制二维和三维图；
- 能够读懂并制作工程图。

Students will understand the concepts of different types of projections, and know how to use them to describe an object.

- Students will understand the basic geometry behind technical drawing.
- Students will be able to create 3D shape with sketching
- Students will be able to use modern CAD tools to model parts and assemblies, and to make drawing for manufacturing.
- Students will be able to read and create technical drawings.

#### 17. 课程内容及教学日历（如授课语言以英文为主，则课程内容介绍可以用英文；如团队教学或模块教学，教学日历须注明主讲人）

**Course Contents (in Parts/Chapters/Sections/Weeks. Please notify name of instructor for course section(s), if this is a team teaching or module course.)**

课程内容	学时分配	教学要求
<p>绪论</p> <ul style="list-style-type: none"> <li>工程制图的应用背景</li> <li>本课程的性质、任务和主要内容</li> <li>投影方法的基本概念</li> </ul> <p>Introduction</p> <ul style="list-style-type: none"> <li>Application background of engineering drawing</li> <li>The objectives and outcome of engineering drawing</li> <li>Concept of Orthographic projection</li> </ul>	2	<p>了解工程制图的背景，不同投影方法的形成及其特点</p> <p>Understand the history and importance of Engineering Graphics</p> <p>Understand the different methods to perform technical drawing, freehand, instruments and computer methods.</p> <p>Understand the various types of projections, perspective, oblique, axonometric and orthographic projections</p>
<p>工程制图的基本知识</p> <ul style="list-style-type: none"> <li>工程制图国家标准基本规定</li> <li>手工绘图基本技能</li> <li>尺规基本几何作图</li> </ul> <p>The basics of engineering drawing</p> <ul style="list-style-type: none"> <li>National standards for engineering drawing</li> <li>Technique about freehand sketch</li> <li>Geometric Construction</li> </ul>	2	<p>了解工程制图的国家标准，了解手工制图的工具和方法</p> <p>Understand National standards for engineering drawing and geometric construction methods</p>
<ul style="list-style-type: none"> <li>基本几何元素（点、线、面）的投影</li> <li>体的三面投影——三视图</li> </ul> <p>工程图中线型表达规定</p> <ul style="list-style-type: none"> <li>Orthographic projection principles of points, lines and planes</li> <li>Multiview drawing</li> <li>Line convention</li> </ul>	2	<p>掌握基本几何元素的三维投影</p> <p>Understand the basic orthographic projection principles of points, lines and planes</p>
<p>简单组合体的表达</p> <ul style="list-style-type: none"> <li>基本几何形体（基本平面体和基本回转体）的三视图</li> <li>三维几何体的形体分析方法</li> <li>简单几何体的三视图</li> </ul> <p>Multiview drawing of simple 3D model</p> <ul style="list-style-type: none"> <li>Projection of basic shapes</li> <li>Constructive solid geometry analysis of 3D model</li> <li>Multiview drawing of simple 3D model</li> </ul>	2	<p>掌握形体分析法</p> <p>掌握简单组合体的投影表达</p> <p>Understand the constructive solid geometry method</p> <p>Understand the Multiview drawing of simple 3D model</p>
<p>复杂组合体的三视图</p> <ul style="list-style-type: none"> <li>平面体和平面体的相互关系</li> <li>平面体和曲面体的相互关系</li> <li>曲面体和曲面体的相互关系</li> </ul> <p>Multiview drawing of Composite 3D model</p> <ul style="list-style-type: none"> <li>Interaction of plane and plane body</li> <li>Intersection of plane and revolving body</li> <li>Intersection of revolving and revolving body</li> </ul>	2	<p>掌握复杂组合体的投影表达</p> <p>Learn the construction method of composite body, and perform orthographic projection of composite body</p>
<p>机体的表达方法</p> <ul style="list-style-type: none"> <li>视图</li> </ul>	4	<p>掌握用合理视图表达机件</p> <p>Learn how to use auxiliary and section views to</p>

<ul style="list-style-type: none"> <li>斜视图/局部视图</li> <li>剖视图</li> </ul> <p>Description of a part</p> <ul style="list-style-type: none"> <li>Orthographic projection views</li> <li>Auxiliary views</li> <li>Section views</li> </ul>		describe a part.
<p>轴测图和透视图</p> <ul style="list-style-type: none"> <li>轴测图基础</li> <li>正等轴测图</li> <li>斜二等轴测图</li> <li>透视图</li> </ul> <p>Axonometric drawing and perspectives</p> <ul style="list-style-type: none"> <li>Concept of Axonometric drawing</li> <li>Isometric drawing</li> <li>Oblique drawing</li> <li>Perspectives</li> </ul>	2	<p>了解轴测图和透视图的形成方法，学会画正等轴测图、斜二等轴测图和透视图</p> <p>Understand the concept of axonometric drawing and perspective and perform drawings</p>
<p>尺寸标注基础</p> <ul style="list-style-type: none"> <li>尺寸标注基本规定</li> <li>组合体的尺寸标注</li> </ul> <p>Fundamentals of Dimensioning</p> <ul style="list-style-type: none"> <li>Dimensioning and Notes</li> <li>General rules about dimensioning</li> <li>Dimensioning of composite body</li> </ul>	2	<p>学习尺寸标注的方法，能够正确的在二维视图上标注尺寸</p> <p>Understand the dimensioning and note conventions in engineering drawing</p>
<p>标准件和常用件</p> <ul style="list-style-type: none"> <li>螺纹和螺纹紧固件</li> <li>键、花键和销</li> <li>齿轮</li> <li>弹簧</li> <li>滚动轴承</li> </ul> <p>Standard parts</p> <ul style="list-style-type: none"> <li>Thread and fasteners</li> <li>Keyways and pins</li> <li>Gear</li> <li>Spring</li> <li>Rolling Bearings</li> </ul>	2	<p>学习工程图中的常用标准件和常用件的画法</p> <p>Understand the engineering drawing of standard parts</p>
<p>零件图</p> <ul style="list-style-type: none"> <li>概述、视图选择、尺寸标注、技术要求和读零件图</li> </ul> <p>Part Drawing</p> <ul style="list-style-type: none"> <li>Introduction</li> <li>Choose views</li> <li>Dimensioning and Notes</li> <li>Technical requirement</li> <li>Read part drawing</li> </ul>	2	<p>学习零件图的读图和画图，在零件图上进行尺寸标注</p> <p>Understand the terminology related to working drawings</p> <p>Be able to read assembly drawings</p>
<p>装配图</p> <ul style="list-style-type: none"> <li>概述、基本规定、视图选择、尺寸标注、零件编号和明细栏</li> <li>画装配图的方法和步骤</li> <li>装配图的读图和拆画零件图</li> </ul> <p>Assembly Drawing</p> <ul style="list-style-type: none"> <li>Introduction</li> <li>Basic requirement</li> <li>Choose views</li> <li>Dimensioning and Notes</li> <li>Procedures of assembly</li> </ul>	2	<p>学习装配图的读图、画图和尺寸标注。理解装配结构和装配关系。学习用装配图来拆画零件图。</p> <p>Understand the terminology related to assembly drawing.</p> <p>Be able to construct and read assembly drawings</p>



drawing		
• Read assembly drawing		
Lab	48	

上机课教学内容、学时分配及教学要求:

课次	课程内容	学时	教学要求 Objectives
1	AutoCAD 基础 AutoCAD Fundamentals	3h	熟悉 AutoCAD 界面和工具栏 使用 AutoCAD 可视化引用命令 使用基本画图工具, 画线和圆 使用基本输入方法定义位置 Be familiar with the AutoCAD screen layout and basic toolbars Use the AutoCAD visual reference commands Draw, using the LINE and CIRCLE commands Use the ERASE command Define Positions using the Basic Entry methods
2	几何构造 Geometric Constructions	3h	理解几何构造工具和方法 通过设置对象捕捉来简化画图 使用编辑及修建命令 Understand the geometric Construction tools and methods Referencing the WCS Set up the use OBJECT SNAPS Edit, using the TRIM command
3	正投影和三视图 Orthographic Projection and Multiview Constructions	3h	画平面体和曲面体的三视图 Perform standard view of plane body and curved body
4	尺寸和文本 Dimensioning and notes	3h	显示和使用坐标工具栏 创建中心线 添加线性和角度尺寸 在文本里加入特殊字符 Display and use the Dimension toolbar Use the AutoCAD Dimension Style Manager Create Center Marks Add Linear and Angular Dimensions Create SPECIAL CHARACTERS in Notes
5	公差和配合 Tolerancing and Fits	3h	在 CAXA 里设置公差选项 Setup the Tolerancing option in AutoCAD
6	设计中的对称特征 Symmetrical Features in designs	3h	使用镜像命令 创建对象的多个副本 在工程图中设置图层 使用属性命令 Use the MIRROR command Create Multiple Copies of objects Set up Layouts in Paper Space Use the PROPERTIES command
7	斜视图和局部视图 Auxiliary Views	3h	了解斜视图和概念 画三维几何体的斜视图 Understand the principles of creating Auxiliary views Use 2D Projection method to draw Auxiliary

8	剖视图 Section Views	3h	使用 CAD 方法创建剖视图 使用对象捕捉快捷方式选项 使用 hatch 命令来画剖视图 Use CAD methods to create Section Views Use the Object Snap Shortcut options Use the HATCH command
9	构造立体几何概念 Solidworks Fundamentals Constructive Solid Geometry Concepts	3h	熟悉 SOLIDWORKS 界面以及了解 SOLIDWORKS 几何建造概念 用拉伸工具选项来建造三维体 Be familiar with the SOLIDWORKS Scree layout Understand the parametric modelling fundamentals Understand the Importance of Order of Features Use the Different Extrusion Options
10	几何关系基础 Feature Design Tree Geometric Relations Fundamentals	3h	熟悉 solidworks 基于特征建模的概念 构造几何元素的关系 熟悉在 solidworks 构造和修改不同几何关系 Understand Feature Interactions Create Geometric Relations Understand and Apply Different Geometric Relations
11- 12	构造几何体的几个特征间的父 母/子女关系以及 BORN 技术 Parent/Child Relationships and the BORN Technique	6h	了解 BORN 技术的概念和应用以及父母/子女关系在建造 几何体中的重要性 Understand the Concept and Usage of the BORN Technique Understand the Importance of Parent/Child Relations in Features
13	零件图和辅助视图的关联 参考几何体 斜视图 Part Drawings and Associative Functionality Reference Geometry and Auxiliary Views	3h	从实体模型创建绘图布局 合理布置二维视图 创建斜视图和局部视图 Create Drawing Layouts from Solid Models Understand Associative Functionality Arrange and Manage 2D Views in Drawing Mode Understand the Concepts and the Use of Reference Geometry Create Auxiliary Views in 2D Drawing Mode
14	设计中的几何体的对称特性 Symmetrical Features in Designs	3h	创建旋转特性 应用镜像命令复制特征 创建圆周阵列和线型阵列 在二维视图中创建剖视图 Create Revolved Features Use the Mirror Feature Command Create Circular Patterns Identify Symmetrical Features in Designs Create a Section View in a Drawing
15	高级三维几何体构造工具 Advanced 3D Construction Tools	3h	设置多个参考平面 创建扫描特征 创建放样特征 使用外壳命令 创建圆角 Understand the Concepts Behind the Different 3D Construction Tools Setup Multiple Reference Planes Create Swept Features Create Lofted Features Use the Shell Command Create 3D Rounds & Fillets
16	装配模型 Assembly Modelling-Putting	3h	理解装配建模方法 理解和控制装配件的自由度

	it all together		组合零件, 生成装配图 创建明细表 Understand the Assembly Modelling Methodology Understand and Control Degrees of Freedom for Assembly Components Place parts using SOLIDWORKS SmartMates Create Exploded Assemblies Create Assembly Drawings Create and Edit a Bill of Materials
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18. 教材及其它参考资料 Textbook and Supplementary Readings

教材  1. 《机械制图》第二版, 田凌, 冯涓, 清华大学出版社, 2013 2. 《机械制图习题集》第二版, 田凌, 许纪旻, 清华大学出版社, 2013 3. Randy Shih, "Principles and Practice. An Integrated Approach to Engineering Graphics and AutoCAD 2017", 2017. 4. Shih, R. and Schilling, P, "Parametric Modeling with SolidWorks 2016," SDC Publications, 2016. ISBN 978-1-58503-998-2.
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课程评估 ASSESSMENT

19. 评估形式 Type of Assessment	评估时间 Time	占考试总成绩百分比 % of final score	违纪处罚 Penalty	备注 Notes
出勤 Attendance				
课堂表现 Class Performance				
小测验 Quiz				
课程项目 Projects		20%		
平时作业 Assignments		40%		
期中考试 Mid-Term Test		20%		
期末考试 Final Exam		20%		
期末报告 Final Presentation				
其它 (可根据需要 改写以上评估方式) Others (The above may be modified as necessary)				

20. 记分方式 GRADING SYSTEM

<input checked="" type="checkbox"/> A. 十三级等级制 Letter Grading
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B. 二级记分制（通过/不通过） Pass/Fail Grading

课程审批 REVIEW AND APPROVAL

21.

本课程设置已经过以下责任人/委员会审议通过

This Course has been approved by the following person or committee of authority

