

# 上海交通大学研究生课程开设申请表

## New Graduate Course Application Form, SJTU

课程基本信息 Basic Information				
<b>*课程名称</b> Course Name	(中文 Chinese) 高等材料热力学 (全英文)			
	(英文 English) Advanced thermodynamics of materials			
<b>*学分</b> Credits	3	<b>*学时</b> Teaching Hours	48 (1 学分≥16 课时)	
<b>*开课学期</b> Semester	秋季学期 Fall	<b>*是否跨学期</b> Cross-semester?	否 No	跨 Spanning over 个学期 Semesters (含夏季学期)。
<b>*课程性质</b> Course Category	专业课 Specialized Course	<b>*课程分类</b> Course Type	全日制课程 For full-time students	
<b>*授课语言</b> Instruction Language	英文 English	<b>主要授课方式</b> Teaching Method	课堂教学 In class teaching	
<b>*成绩类型</b> Grade	等第制 Letter grading	<b>主要考核方式</b> Exam Method	笔试 Written Exam	
<b>*开课院系</b> School	材料科学与工程学院			
<b>所属学科</b> Subject				
<b>负责教师</b> Person in charge	姓名 Name	工号 ID	单位 School	联系方式 E-mail
	邹建新		材料科学与工程学院	zoujx@sjtu.edu.cn
	李扬欣		材料科学与工程学院	astatium@sjtu.edu.cn
课程扩展信息 Extended Information				
<b>*课程简介</b> (中文) Course Description	<p>(分段概述课程定位、教学目标、主要内容、先修课程等；不少于 200 字。)</p> <p>以热力学和统计热力学的原理和方法研究材料问题，称为材料热力学。它与动力学、晶体学以及固体物理和固体化学组成材料科学的基础。材料工程包括材料的设计、制造、成型和检验，它是应用材料科学的原理进行材料设计和加工的综合学科，与材料科学和工程已成为一个整体。</p> <p>热力学在这个领域的应用，对发展材料的品种、提高材料的质量，日益显示其积极的作用。应用材料热力学原理可以阐明和预测相图、相变以及材料的其他物理现象。材料热力学既掌握热力学的基本知识，又能将这些原理和方法结合材料实践加以应用。重点掌握热力学的基本概念、原理和方法，理解相图的构成规则和诠释相图。</p> <p>高等材料热力学是在学生已经掌握本科水平的材料热力学或者材料物理化学的基础上，进一步梳理课程内容，在教学内容和教学深度上做到本硕博良好衔接。学习内容上要求掌握更高等水平，掌握相变、相图、界面、统计、不可逆过程等热力学原理。熟悉并初步掌握热力学基本原理在材料设计和加工中的应用，学以致用。</p>			
<b>*课程简介</b> (English) Course Description	<p>(须与中文一致，翻译请力求信达雅。)</p> <p>Thermodynamics and statistical thermodynamics are used to study the material problem and the thermodynamics of appellation material. It is based on dynamics, crystallography, solid state physics and solid chemistry. Materials engineering includes materials design, manufacturing, molding and inspection. It is a comprehensive discipline that applies material science principles to design and process materials and combined with material science and engineering as a complete part.</p> <p>The application of thermodynamics in this field plays an active role in developing varieties</p>			

	<p>of materials and improving the quality of materials. The application of material thermodynamics principle can clarify and predict phase diagrams, phase transitions and other physical phenomena of materials. Material thermodynamics not only grasps the basic knowledge of thermodynamics, but also applies these principles and methods to material practice. We should grasp the basic concepts, principles and methods of thermodynamics, understand the rules of phase diagram and interpret phase diagrams.</p> <p>The advanced thermodynamics is based on the material thermodynamics and physical chemistry courses which have be mastered in the undergraduate level. This course requires combs the course content, and makes a good connection between the teaching content and teaching depth. The students need to master higher level in learning content, grasp the thermodynamics principles of phase transformation, phase diagram, interface, statistics, irreversible process and so on. Be familiar with and grasp the application of the basic principles of thermodynamics in material design and processing, and apply it to practice.</p>																																	
<p>*教学大纲 (中文) Syllabus</p>	<p>(建议列表形式, 各列内容: 章节、主要内容、课时数、教学方式)</p> <table border="1" data-bbox="432 611 1418 1514"> <thead> <tr> <th>教学内容</th> <th>授课学时</th> <th>教学方式</th> </tr> </thead> <tbody> <tr> <td>课程导论</td> <td>3</td> <td>课堂教学</td> </tr> <tr> <td>基础热力学内容</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>溶体模型与相图计算</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>相变热力学</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>期中考试</td> <td>3</td> <td>随堂开卷</td> </tr> <tr> <td>界面热力学</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>统计热力学概述</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>不可逆过程</td> <td>3</td> <td>课堂教学</td> </tr> <tr> <td>课程设计</td> <td>6</td> <td>课堂教学</td> </tr> <tr> <td>期末考试</td> <td>3</td> <td>随堂开卷</td> </tr> </tbody> </table>	教学内容	授课学时	教学方式	课程导论	3	课堂教学	基础热力学内容	6	课堂教学	溶体模型与相图计算	6	课堂教学	相变热力学	6	课堂教学	期中考试	3	随堂开卷	界面热力学	6	课堂教学	统计热力学概述	6	课堂教学	不可逆过程	3	课堂教学	课程设计	6	课堂教学	期末考试	3	随堂开卷
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		Surface and interface	6	In class teaching
		Statistical thermodynamics	6	In class teaching
		Irreversible process	3	In class teaching
		Course design presentation	6	In class evaluating
		Final Examination	3	Open-book
*课程要求 (中文) Requirements	<p>(课程考核方式、考核标准等; 不少于 50 字) 课程最终成绩由以下 5 部分组成:</p> <ol style="list-style-type: none"> <li>1. 课后作业, 占总成绩的 10%;</li> <li>2. 课堂表现, 占总成绩的 10%;</li> <li>3. 口头报告, 占总成绩的 20%;</li> <li>4. 期中考试, 占总成绩的 20%;</li> <li>5. 期末考试, 占总成绩的 40%.</li> </ol>			
*课程要求 (English) Requirements	<p>(须与中文一致, 翻译请力求信达雅。) The final score is comprised of the following 5 parts:</p> <ol style="list-style-type: none"> <li>1. homework, 10%;</li> <li>2. class performance, 10%;</li> <li>3. oral presentation, 20%;</li> <li>4. mid-term examination, 20%</li> <li>5. final examination, 40%.</li> </ol>			
课程资源 (中文) Resources	<p>(教材、教参、网站资料等。) 教科书: David V. Ragone, Thermodynamics of Materials, Vol. I and II, John Wiley &amp; Sons, The MIT Series, 1995. David R. Gaskell, Introduction to The Thermodynamics of Materials, Fourth Edition, Taylor &amp; Francis Books, Inc. 2003.  参考书: 《材料热力学》、江伯鸿编著、上海交通大学出版社、1999 《物理化学》、程兰征, 章燕豪等编、上海科学技术出版社、1997 《物理化学简明教程》、印永嘉, 奚正楷, 李大珍等编、高等教育出版、1992</p>			

	<p>《金属材料热力学》、徐祖耀著、科学出版社、1981</p> <p>《材料热力学》，徐祖耀主编，高等教育出版社，2009.</p> <p>《微观组织热力学》，西泽泰二著，郝士明译，化学工业出版社，2006.</p>
课程资源 (English) Resources	<p>(须与中文一致，请力求信达雅。)</p> <p><b>Text Books</b></p> <p>David V. Ragone, Thermodynamics of Materials, Vol. I and II, John Wiley &amp; Sons, The MIT Series, 1995.</p> <p>David R. Gaskell, Introduction to The Thermodynamics of Materials, Fourth Edition, Taylor &amp; Francis Books, Inc. 2003.</p> <p><b>References</b></p> <p>Richard A. Swalin, Thermodynamics of Solids, 2nd ed., John Wiley &amp; Sons, 1972.</p> <p>Robert T. DeHoff, Thermodynamics in Materials Science, McGraw-Hill, Inc. 1993</p>
备注 Note	