Information Form for SJTU Graduate Profession Courses

<table>
<tr><th colspan="6">Basic Information</th></tr>
<tr><td rowspan="2">* Course Name</td><td colspan="5">Chinese</td></tr>
<tr><td colspan="5">English Frontiers of modern experimentation in materials science</td></tr>
<tr><td>* Credits</td><td>2</td><td>* Teaching Hours</td><td colspan="3">32 1 =16</td></tr>
<tr><td>* Semester</td><td>Spring</td><td>* Cross-semester?</td><td>No</td><td colspan="2">Spanning over Semesters</td></tr>
<tr><td>* Course Type</td><td>Program Elective Course</td><td>* Course Type</td><td colspan="3">For full-time students</td></tr>
<tr><td>* Course Category</td><td>Specialized Course</td><td>Targeting Students</td><td colspan="3">Doctoral Level</td></tr>
<tr><td>* Instruction Language</td><td>Chinese</td><td>Teaching Method</td><td colspan="3">Online teaching</td></tr>
<tr><td>* Grade</td><td>Letter grading</td><td>Exam Method</td><td colspan="3">Essay</td></tr>
<tr><td>* School</td><td colspan="5"></td></tr>
<tr><td>Subject</td><td colspan="5"></td></tr>
<tr><td rowspan="2">Person in charge</td><td>Name</td><td>ID</td><td>School</td><td colspan="2">E-mail</td></tr>
<tr><td></td><td></td><td></td><td colspan="2">lantingzh@sjtu.edu.cn</td></tr>
<tr><th colspan="6">Extended Information</th></tr>
<tr><td>* ( ) Course Description</td><td colspan="5">- - -

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1. STEM, FIB, 3DAP, XMCD
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4. (PPMS)
5. (STM, AFM)
6. (XPS, AES)
7. (ICP)
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9.</td></tr>
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* English Course Description	A systematic relationship among the composition-process-property-characterization forms the tetrahedron of materials science and engineering. Characterization lies in the center of the tetrahedron which correlates the causal relationship among composition, process and properties. On the basis of the related undergraduate courses and professional core course of graduate students, the present course aims at graduate students working for a PhD degree. Based on the fundamental microscopy and spectroscopy methods, the cutting-edge progress in the characterization methods and techniques is covered in the course, conforming to the trend of high-sensitivity, high-spatial resolution and quantitative analysis analytical technique. In the meanwhile, how modern analytical technique can be applied to solving engineering problems is explained by case studies.
* ( ) Syllabus	

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* English Syllabus	
Content	
Multi-scale association method for tissue structure characterization (I)	2
Multi-scale association method for tissue structure characterization (II)	2
X-ray fluorescence spectroscopy (XRF) and experiment	2
Scanning probe microscopy (STM, AFM)	2
PPMS and experiment	2
Material surface analysis technology (XPS, AES, etc.)	2
Material surface analysis technology (XPS, AES, etc.) experiment	2
Elemental Analysis Technology (ICP)	2
Elemental Analysis Technology (ICP)	2

	experiment	
	Infrared, Raman spectroscopy and experiment	2
	In-situ transmission electron microscopy characterization	2
	Synchrotron radiation principle and technology	2
	Condensed state spectroscopy and its application in semiconductor material physics research	2
	In-situ characterization of material behavior based on synchrotron radiation	2
	Progress in thermal analysis of modern polymer materials	2

* Requirements	50 1. 30% 2.
* English Requirements	1. Each lecture student needs to attend and attendance, and no grades will be given to those who miss more than 30% of classes! 2. Each student can combine their thesis work, choose two different aspects, and write two reading reports on the basis of expanding the reading literature.
* Resources	1. , , , , , 1982 2. J.W. Edington, Practical Electron Microscopy, Pt. 1-4, Macmillan, 1974-76 3. J.C.H. Spence, Experimental High Resolution Electron Microscopy, Oxford, 1980 , , , , , 1988 4. , , , , 1988 5. D.C. Joy, A.D. Romig, Jr. and J.I. Goldstein, Principles of Analytical Electron Microscopy, Plenum Press, New York, 1986 6. David B. Williams, Practical Analytical Electron Microscopy in Materials Science, Philips Electronic Instruments Inc., Electron Optics Publishing Group, 1984 7. John J. Hren, Joseph I. Goldstein and David C. Joy, Introduction to Analytical Electron Microscopy, Plenum Press, New York, 1979 8. , , , , , 1989 9. David B. Williams and C. Barry Carter, Transmission Electron Microscopy – A Textbook for Materials Science 10. , , , , 2007
* English Resources	1. , , Metal Electron Microscopy, , BeiJing, 1982 2. J.W. Edington, Practical Electron Microscopy, Pt. 1-4, Macmillan, 1974-76 3. J.C.H. Spence, Experimental High Resolution Electron Microscopy, Oxford, 1980 , , , , 1988 4. , High spatial resolution electron microscopy, , ,

	1988 5. D.C. Joy, A.D. Romig, Jr. and J.I. Goldstein, Principles of Analytical Electron Microscopy, Plenum Press, New York, 1986 6. David B. Williams, Practical Analytical Electron Microscopy in Materials Science, Philips Electronic Instruments Inc., Electron Optics Publishing Group, 1984 7. John J. Hren, Joseph I. Goldstein and David C. Joy, Introduction to Analytical Electron Microscopy, Plenum Press, New York, 1979 8. , , , Electron microscopic analysis of material structure, , 1989 9. David B. Williams and C. Barry Carter, Transmission Electron Microscopy – A Textbook for Materials Science 10. , Introduction to Analytical Electron Microscopy, , , 2007
Note	