

## Information Form for SJTU Graduate Profession Courses

Basic Information				
* Course Name	Chinese			
	English Crystalization Principle			
* Credits	2	* Teaching Hours	32 1 =16	
* Semester	Fall	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	Both full & part time students	
* Course Category	Specialized Course	Targeting Students	Doctoral Level	
* Instruction Language	Chinese	Teaching Method	In class teaching	
* Grade	Letter grading			

Extended Information				
* ( ) Course Description	200			
* English Course Description	<p>This course focuses on the basic laws of crystal growth and explains the basic phenomena during growth. Main content includes: theory of heat, mass and momentum transmission, temperature field, solute condensation, liquid flow effect and formation of growth layer; component undercooling and interfacial stability; the phase equilibrium and phase diagram, the macroscopic properties and microstructure of interface are discussed from thermodynamics and statistical physics; kinetic process of crystal growth-- nucleation and growth processes. Starting from the general process of crystallization of metal materials, the crystallization of primary phase and eutectic are introduced; crystal growth during film preparation; recrystallization and grain growth of metals.</p> <p>Aim of course Through the study of this course, master and understand the primary phase and eutectic crystallization process of metal melt, metal recrystallization and grain growth, thin film crystal growth and other crystal growth physical basis, crystal growth process.</p>			

* ( ) Syllabus			
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Content	Hours	Format
Introduction	2	Teaching
Chapter1 Solute condensation and mass transport	2	Teaching
Chapter1 Mixed transfer of heat and mass	2	Teaching
Chapter3 Growth rate fluctuation and growth layer	2	Teaching
Chapter4 Interfacial stability and component undercooling	2	Teaching
Chapter5 Macro-proper microstructure of interface	2	Teaching
Section 1 Interface energy and interfacial tension		
Section 2 Interface handover		
Section 3 Phase balance at curved interface	2	Teaching
Section 4 Meniscus and straight pull growth		
Chapter6 Nucleation	2	Teaching
Chapter7 Growth kinetics	2	Teaching
Chapter8 Primary phase growth of alloy	2	Teaching
Section 1 Morphology of facet primary phase		
Section 2 Morphology of non-facet primary phase		
Section 3 Brody-Flemings model of dendrite arrangement	2	Teaching
Section 4 Effect of fluid flow on crystal growth		
Chapter9 Eutectic growth	2	Teaching
Section 1 eutectic nucleation		
Section 2 Normal eutectic growth		
Section 3 Abnormal eutectic growth	2	Teaching
Section 4 Symbiotic zone		
Chapter10 Crystal growth during film preparation	2	Teaching
Chapter11 Recrystallization and grain growth of metals	2	Teaching

	Section 1 Recrystallization nucleation Section 2 Recrystallization grain growth		
	Section 3 Static and dynamic recrystallization Section 4 Continuous recrystallization and discontinuous recrystallization Section 5 Effect of second phase on recrystallization	2	Teaching
* Requirements	50 1		
* English Requirements	Submit a review paper depending on your interest.		
* Resources	1. Roy Elliott. Eutectic Solidification Processing. Butterworths & Co(Publishers) Ltd. 1983 2. . 1982 3. . 1999 4. . 1995 5. 1994 6.( ) . 1985		
* English Resources	1. Roy Elliott. Eutectic Solidification Processing. Butterworths & Co(Publishers) Ltd. 1983 2. Naiben Min. Physical basis of crystal growth. Shanghai Science and Technology Press. 1982 3. Weizhuo Zhong, SukunHua. Morphology of Crystal Growth. Science Press. 1999 4. Lianzeng Yao. Crystal growth foundation. China University of Science and Technology Press. 1995 5. Weimin Mao, Xinbing Zhao. Recrystallization and grain growth of metals. Metallurgical Industry Press. 1994 6. (Russia) . Gregory. Recrystallization of metals and alloys. 1985		
Note			