

## Syllabus

Course Code	MSE8303	* Teaching Hours	32	* Credits	2
* Course Name	English Virtual manufacturing Technology in Material Processing				
* Instruction Language	Chinese				
* School	School of Materials Science and Engineering				
* Students	硕士、博士（包括硕博连读）				
	Master's degree, doctor's degree (including successive master doctor program )				
Prerequisite	Mechanics of materials,mechanics of elasticity, numerical calculation				
Instructors	Name	Title	Department	E mail	
				luhao@sjtu.edu.cn	
* Course Description	1 2 3 4 5				
* English Course Description	This course introduces the fundamental methodologies on materials processes modelling and numerical analysis. It covers topics of programing and simulation of heat transfer, stress and strain, phase transition, and creep in materials pro o gain fundamental knowledge of numerical analysis of temper distortion, microstructure and damage in materials process. 4. To be exposed to industrial practices of engineering projects involves above phenomena. 5. To gain skills in research with numerical simulation.				

		Content	Hours	Format	Instructor
	1	1.1			

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Schedules

	Content	Hours	Format	Instructor
* English Schedules	1 Introduction 1.1 Virtual engineering 1.2 Models and modeling methods 1.3 Numerical analysis algorithm 1.4 Application Example	2	Class teaching	
	2 Thermal process calculation 2.1 Finite difference method 2.2 Finite element method 2.3 Thermal process calculation 2.4 Program structure features and implementation	4	Class teaching /practice	
	3 Thermodynamic process calculation 3.1 Stress deformation 3.2 Theory of elasticity and thermal strain 3.3 Inherent strain theory 3.4 Thermal elastoplasticity theory 3.5 Solid Phase Transformation calculation 3.6 Hybrid methods for calculating and testing the mechanical properties of tissues 3.7 Comparison of various calculation methods	12	Class teaching /Discussion /practice	
	4 Theory and application of viscoelastoplasticity 4.1 Creep theory 4.2 Temperature and stress calculation 4.3 Problems in the application of theory 4.4 Evaluation method for local post weld heat treatment	4	Class teaching	
	5 Numerical inversion and AI technology 4hours 5.1 Numerical inversion 5.2 Optimization of model parameters	4	Class teaching / Discussion	
	6 Project cases	4	Class teaching	
	7 Assignment discussion	2	Discussion	
* English Grading Policy	1 Calculate and review assignments. 2 Assignment discussion.			
* English Textbooks & References	1 Welding numerical simulation technology and application Jianhua Wang, Shanghai Jiao Tong University Press, 2003 10			
Notes				

