

## Kphqt o cvkqp "Hqt o "hqt "ULVW" I t c f w cvg "Rtqhguukqp" Eqwtugu"

Dcuke "Kphqt o cvkqp"				
* Course Name	Chinese			
	English Simulation Theory and System Analysis of Metal Forming Process			
* Credits	3	* Teaching Hours	48 1 =16	
* Semester	Spring	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	For full-time students	
* Course Category	Specialized Course	Targeting Students	Doctoral Level	
* Instruction Language	Chinese	Teaching Method	In class teaching	
* Grade	Letter grading	Exam Method	Essay	
* School	050 School of Material Science and Engineering			
Subject	Material Science and Engineering			
Person in charge	Name	ID	School	E-mail
	CHEN Jun		School of Material Science and Engineering	jun_chen@sjtu.edu.cn
Gzvpg fgf "Kphqt o cvkqp"				
* ( ) Course Description	( )			
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* English Course Description	<p>Course introduction: In this course, we will introduce plasticity models, deformation theory based variational principle, flow theory based variational principle, small deformation based elasto-plastic FEM, large deformation based elasto-plastic FEM, rigid plastic FEM, the key technologies for the implementation of numerical simulation, engineering applications of numerical simulations by elasto-plastic FEM and rigid-plastic FEM. This course is an important fundamental course for numerical simulation of metal forming processes.</p> <p>Course objectives: (1) Understand different methods for metal forming process numerical simulation and relevant fundamentals of mathematics and mechanics; (2) Grasp the fundamental theories of elasto-plastic FEM and rigid-plastic FEM; (3) Understand the plasticity models and the methods to determine their parameters; (4) Get to know the state-of-the-art about metal forming process numerical simulation and the future trends; (5) Build the capability to use commercial software tools for metal forming process numerical simulation.</p>			

<p>* ( ) Syllabus</p>	<table border="0"> <tr><td>1</td><td></td><td>3</td><td></td><td></td><td>+</td><td></td></tr> <tr><td>2</td><td></td><td></td><td>3</td><td></td><td></td><td>+</td></tr> <tr><td>3</td><td>3</td><td></td><td></td><td></td><td>+</td><td></td></tr> <tr><td>4</td><td>6</td><td></td><td></td><td></td><td>+</td><td></td></tr> <tr><td>5</td><td>3</td><td></td><td></td><td></td><td>+</td><td></td></tr> <tr><td>6</td><td></td><td>6</td><td></td><td></td><td></td><td>+</td></tr> <tr><td>7</td><td></td><td>3</td><td></td><td></td><td></td><td>+</td></tr> <tr><td>8</td><td></td><td></td><td>6</td><td></td><td></td><td></td><td>+</td></tr> <tr><td>9</td><td></td><td></td><td></td><td>6</td><td></td><td></td><td></td><td>+</td></tr> <tr><td>10</td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>+</td></tr> <tr><td>11</td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>+</td></tr> <tr><td>12</td><td></td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>+</td></tr> </table>	1		3			+		2			3			+	3	3				+		4	6				+		5	3				+		6		6				+	7		3				+	8			6				+	9				6				+	10			3					+	11			3					+	12				3					+
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<p>* English Syllabus</p>	<p>Chapter 1 Background of metal forming technologies and fundamentals of numerical simulation; 3 teaching hours (TH); In-class teaching and discussion  Chapter 2 Calculus of variations about plastic deformation and flow law; 3 THs; In-class teaching and discussion  Chapter 3 Small deformation theory-based elasto-plastic finite element method; 3 THs; In-class teaching and discussion  Chapter 4 Finite deformation theory-based elasto-plastic finite element method; 6 THs; In-class teaching and discussion  Chapter 5 Rigid visco-plastic finite element method; 3 THs; In-class teaching and discussion  Chapter 6 Flow stress model, yield function, hardening model, forming limit curve and ductile fracture criterion and parameter calibrations; 6 THs; In-class teaching and discussion  Chapter 7 Framework of numerical simulation system and advanced development; 3 THs; In-class teaching and discussion  Chapter 8 Key technologies for rigid visco-plastic FEM implementation; 6 THs; In-class teaching and discussion  Chapter 9 Key technologies for elasto-plastic FEM implementations; 6 THs; In-class teaching and discussion  Chapter 10 Numerical simulation applications of rigid visco-plastic FEM; 3 THs; In-class teaching and discussion  Chapter 11 Numerical simulation applications of elasto-plastic FEM; 3 THs; In-class teaching and discussion  Chapter 12 Cutting edge questions on metal forming technologies and numerical simulation; 3 THs; In-class teaching and discussion</p>																																																																																														
<p>* Requirements</p>	<p>10-15</p>																																																																																														
<p>* English Requirements</p>	<p>Grading: In the last week, each student shall make a 10-15 minute presentation related with the course. After the course is finished, each student shall submit a review report or an academic report/article related with the course within 2 months.</p>																																																																																														
<p>* Resources</p>	<p>[1] 1999  [2] 1990  [3] 1989  [4] 1989  [5] 1997  [6] 2005  [7] 1988  [8] S. Kobayashi, S.I. Oh, T. Altan. 1989, Metal Forming and the Finite Element Method, Oxford University Press  [9] J. Hallquist, 2006, LS-Dyna Theory Manual, www.lstc.com</p>																																																																																														
<p>* English Resources</p>	<p>[1] PENG Yinghong, 1999, Numerical Simulation Technologies for Metal Forming Processes, Shanghai Jiao Tong University Press  [2] QIAO Duan and QIAN Rengen, 1990, Nonlinear Finite Element Method and Its Applications in Plastic Forming, Metallurgical Industry Press  [3] LV Liping, 1989, Finite Element Method and Its Applications in Forging Process,</p>																																																																																														

	<p>Northwestern Polytechnical University Press</p> <p>[4] CHEN Ruxin, HU Zhongmin, 1989, Plastic Finite Element Method and Its Applications in Metal Forming Processes, Chongqing University Press</p> <p>[5] ZHONG Zhihua, LI Guangyao, 1997, Computer Simulation and Application of Sheet Metal Forming Process, Beijing University of Technology Press</p> <p>[6] LIN Zhongqin, 2005 Numerical Simulation of Auto Panel Stamping Processes, Mechanical Engineering Press</p> <p>[7] JIANG Youliang, 1988, Nonlinear Finite Element Method, Beijing Institute of Technology Press</p> <p>[8] S. Kobayashi, S.I. Oh, T. Altan. Metal Forming and the Finite Element Method, Oxford University Press, 1989</p> <p>[9] J. Hallquist, LS-Dyna Theory Manual, www.lstc.com, 2006</p>
Note	