Information Form for SJTU Graduate Profession Courses

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Credits Teaching Hours

* Semester	Fall	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	For full-time students	
* Course Category	Specialized Course	Targeting Students	Master Level	
* Instruction Language	Chinese	Teaching Method	In class teaching	
* Grade	Letter grading	Exam Method		
* School				
Subject				

Person in charge	Name	ID	School	E-mail
				hbchen@sjtu.edu.cn

Extended Information

* ( ) Course Description	200
* English Course Description	Industrial robotics applications are a professional elective course in material science and engineering major. This course provides the basic theoretical knowledge of robotics, robot design, robot control and robot programming. It is important for our students which engaged in robot research and development. Through the study of this course, students will be able to understand robotic theoretical knowledge such as robot design, control, and programming, and have a deep understanding of industrial robot technology. They will initially have the ability to analyze and design robot systems. This course is mainly composed of robot mathematics foundation, robot kinematics and dynamics, robot control, industrial application, and special lectures.

* ( ) Syllabus	1) 2 2) 6 3) 8 - - 4) 6 - 5) 2 6) 6 7) 2
* English Syllabus	1) Introduction This course provides the origin and development of robotics, discuss the definition of robotics, analyze the characteristics, structure and classification of robots. 2) The mathematical foundation of robotics The position and posture transformation of any point in space, coordinate transformation, homogeneous coordinate transformation, object transformation and inverse transformation, and general rotation transformation, etc. Special Lecture: Research Progress of the Humanoid Robots 3) Robot kinematics (8 hours) The robot's motion position and posture, direction angle, motion position and coordinate motion equations, as well as the representation of the link transformation matrix, Euler transform, roll-pitch-bias transform, and spherical transform, and other solutions, robot differential motion and its Jacobian matrix. Special Lecture: Design Case of Mobile Welding Robot 4) Robot dynamics (6 hours) Robot dynamics equations, dynamic characteristics and static characteristics; focus on the analysis of two methods of manipulator dynamics equations, namely Lagrange functional balance method and Newton-Eulerian dynamic balance method. 5) Robot sensor (2 hours) Introduce sensors of the robot. 6) Robot control (6 hours) Basic robot control principles, robot position control, robot intelligent control principles, path planning and path generation. 7) Application and development of robot technology (2 hours) Introduction to the latest application of industrial robot.
* Requirements	50 + + 40 40 20
* English Requirements	Final homework + midterm homework + attendance Composition of results: 40% for final homework, 40% for midterm homework, 20% for attendance

* Resources	2009 R. Murry, Z.X. Li, and S. Sastry , A Mathematical Introduction to Robotic Manipulation, CRC Press, 1994.
* English Resources	Fundamentals of Robotics Zixing Cai China Machine Press 2009 R. Murry, Z.X. Li, and S. Sastry , A Mathematical Introduction to Robotic Manipulation, CRC Press, 1994.
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