Syllabus of Spring Semester, 2019

Course Title	Advanced Robotics(I)	**Course Code**	MN68297	**Section**	001
Department	Intelligent Control and Automation in the School of Mechanical Engineering	**Level**	All	**Credit - Theory - Practice**	3.0 - 3.0 - 0.0
Class Hours & Classroom	Mon. 16:30-19:30 303-826				
Lecturer	LEE,MIN-CHEOL	**Office**	Mechanical(M) Building 819	**Office Hours**	Tue 17:00 ~18:00
		Telephone	510-2439	**E-mail**	mclee@pusan.ac.kr
Methodology of Instruction	Lecture, Term Project Presentation				
Evaluation and Grading	Midterm : 40% Term project and Presentation : 40% Homework and attendance : 20% * Students with disabilities can request an extension of the exam hour, and they can take exams by getting writing assistance or by using a computer.				
Prerequisites	Control Theory, Kinematics, Dynamics				
Course Objectives	This course is to open for the graduate students who have basic knowledge of robot manipulators and linear control theory. In this course, we expect that the student can induce the kinematics, dynamics, control trajectory planning, sensors and actuators of robot manipulators and design nonlinear robot contorllers. And we also expect that the students can analize the stability of the controlled robot systems and choose the proper controller for the given systems. This course aims for students to get a concept of robotics and related technique.				
Course Description	This course mainly includes the following topics: the property of robot manipulator kinematics, dynamics, trajectory planning, computed-torque control design, adaptive control design, robust control design, and stability analysis of the controlled robot systems In first 5 weeks, Introduction, the kinematics and dynamics of industrial robot are introduced. Next 4 weeks, Trajectory planning, path planning, robot control algorithm, sensors and actuators are introduced. Next 4 weeks, Paper work and presentation of Intelligent robot and term project are introduced. * Students with disabilities can negotiate with the Disabled Student's Academic Support Center regarding course materials and assignments.				
Textbooks and References					
Required Textbooks	1. K.S. Fu, R.C.Gonzalez, C.S.G.Lee, ROBOTICS : Control, Sensing, Vision, and Intelligence, McGraw-Hill, 1987 2. Saeed B Niku, Introduction to Robotics Analysis, Systems, Applications, Prentice Hall, 2002 (Translation by Jung Ha Kim and Young IL Youm, Robotics, Scitech Media, 2002)				
References	1. M.W. Spong, M. Vidyasagar, Robot Dynamic and Control, John Wiley & Sons, 1989◦ 2. John.J. Craig, Introductions to Robotics Mechanics and Control, Addison-Wesley, 1989 3. R. P. Paul, Robot Manipulators, The MIT Press, 1981◦ 4. M. Brady, J. M. Hollerback, T.L. Johnson, Robot Motion, Planning and Motion, The MIT Press, 1982◦ 5. D.R. Malcolm, Robotics an Introduction, PWS-KENT Pub, 1989◦ 6. Y. Nakamura, Advanced Robotics :◦Redundancy and Optimization, Addison-Wesley, 1991 7. J.M. Skoronsky, Control Dynamics of Robotic Manipulators, Academic Press, 1986◦ 8. F.L.Lewis, Control of Robot Manipulators, Macmillan, 1993 9. Yoram Koren, Robotics for Engineers, McGraw-Hill, 1987 10. R. J. Schilling, Fundamentals of Robotics, Prentice Hall, 1990 11. P. J. McKerrow, Introduction to Robotics, Addison-Wesley, 1991 12. James G. Keramas, Robot Technology Fundamentals, Thomson Learning, 1999				

Weekly Schedule of Classes		
Week No.	Course Material	Assignments and Other Notes
Week 1	[Orientation and Education on Academic Misbehavior(e.g. Cheating, Plagiarism) and Safety Education on Experiment and Practice] Introduction: Robotics	
Week 2	Kinematics of robot arms	(Niku) Problems. 20, 21, 24
Week 3	Kinematics of robot arms	Kinematics of SCARA and PUMA type Robot
Week 4	Dynamics of robot arms	
Week 5	Dynamics of robot arms(Lagrange-Euler Dynamics)	Dynamicss of SCARA and PUMA type Robot
Week 6	Planning of Trajectory	Term Project Theme 1. Computer torque control based simulation of SCARA and PUMA Robot by using inverse kinematics 2. Choose intelligent robot control and it's simulation of SCARA and PUMA type Robot. And compare it's results
Week 7	Control of Robot Manipulator	
Week 8	Midterm Test	
Week 9	Sensors & Actuators	
Week10	Control of Robot Manipulator Sliding Mode Control	
Week11	Control of Robot Manipulator Modified Sliding Mode Control	
Week12	Paper Work and Presentation of Intelligent Robot	Intelligent Robot Control or Intelligent Robot(Service, Humanoid, Surgery, Underwater, and Military) Technique
Week13	Paper Work and Presentation of Intelligent Robot	Intelligent Robot Control or Intelligent Robot(Service, Humanoid, Surgery, Underwater, and Military) Technique
Week14	Presentation of Term Project	Report of Term Project Presentation
Week15	Presentation of Term Project	Report of Term Project Presentation
Week16		
Attachment		