

Mechanics and Control of Robot Manipulators (28865)

Objective: This course is designed to provide the students with the fundamental methods, mathematical approaches and technological tools based on which a robot manipulator is designed and operated. Mechanics of the robotic manipulators is the major focus (70%) which is followed by the design and analysis of control systems to operate a robot (30%).

Textbooks: *M.W. Spong, S. Hutchinson & M. Vidyasagar, "Robot Modeling and Control" John Wiley, 2006*
L.W. Tsai, "Robot Analysis: The Mechanics of Serial and Parallel Manipulators", John Wiley, 1999
(Both available on CW)

Assignments: Eight assignments will be given throughout the term according to the following timetable. Students are supposed to do the assignments individually. (30% of the total mark).
Submission is allowed until 24:00 of the due date
*Delay will be penalized by 5% of the mark per day for a maximum of 10 days (after that, submission is not accepted)

No.	Subject
1	Homogenous transformation
2	Building a robot model
3	Inverse Kinematics
4	Jacobian
5	Trajectory Design
6	Obstacle avoidance
7	Road Mapping
8	Robot Control

Examinations: Two pages of formula and an approved calculator are allowed.
(Lecture notes and worked examples are NOT)
Midterm: Up to the end of Section 4, (30% of the total mark)
Final exam: The last 4 sections of the course according to the following list (40% of the total mark)

Course contents:

1. Introduction and history

2. Spatial description of rigid bodies
3. Kinematics modelling of serial and parallel manipulators
4. Velocity and Jacobian analysis
5. Statics and stiffness modelling
6. Path planning and obstacle avoidance
7. Trajectory planning
8. Dynamics and control of robotic manipulators

Class Discipline

- According to the university regulations, class absence is allowed up to 4/17 of the total lectures (i.e. 7 lectures). If you miss 8 or more lectures for any reason you need to withdraw the course. Attendance will be checked at the beginning of each lecture
- During the semester, you may receive critical notifications about the course materials through your email account that is registered with the education office. Make sure you check it regularly.