Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
INF430	Robotics	7	3	0	0	3	4

Prerequisites	ING220
Admission Requirements	ING220

Language of Instruction	French
Course Type	Elective
Course Level	Bachelor Degree
Objective	This course aims to introduce the fundamentals of robotics and its applications. Various software/hardware components to design and implement robotics applications are presented to the students. Different types of robots, actuators, sensors, open or closed loop system structures, robot control, kinematic equations, motion and trajectory planning algorithms, human-robot interaction are covered in the course content. Students are expected to apply the theoretical knowledge they have learned in the lectures into practice through applications and/or projects during the class hours.
Content	1. Introduction to robotics 2. Actuators, types of actuators 3. Sensor, types of sensors, degrees of freedom 4. Forward kinematics 5. Backward kinematics 6. Rotation matrix, homogeneous transformations 7. Euler representation, roll-pitch-yaw 8. Denavit-Hartenberg notation 9. Midterm exam 10. Introduction to human-robot interaction 11. PID controller 12. Lab: PID controller calibration 13. Lab: 2-joint robot arm control, derivation of forward and inverse kinematic equations 14. Student presentations
References	1) M.W. Spong, S.Hutchinson and M. Vidyasagar, “Robot Modeling and Control”, Wiley, 2006. 2) Phillip John McKerrow, “Introduction to Robotics”, Addison-Wesley, 1991. 3) Saeed B. Niku, “Introduction to Robotics. Analysis, Systems, Applications”, Prentice Hall, 2001. 4) Vladimir J. Lumelsky, “Sensing, Intelligence, Motion”,Wiley, 2006. 5) S. M. LaValle, “ Planning Algorithms”, Cambridge University Press, 2006. URL adresi http://planning.cs.uiuc.edu/.

Theory Topics

Week	Weekly Contents
1	Introduction to robotics
2	Actuators, types of actuators
3	Sensor, types of sensors, degrees of freedom
4	Forward kinematics
5	Backward kinematics
6	Rotation matrix, homogeneous transformations
7	Euler representation, roll-pitch-yaw angles

Week	Weekly Contents
8	Denavit-Hartenberg notation
9	Midterm
10	Introduction to human-robot interaction
11	PID controller
12	Lab: PID controller calibration
13	Lab: 2-joint robot arm control, derivation of forward and inverse kinematic equations
14	Student presentations