



Philadelphia University

Faculty of Engineering and Technology
Mechatronics Engineering Department

Course Details:

- Title:** Robotics and Automation (0640542)
- Prerequisite:** Machines Theory (062033300)
- Credit Hours:** 3 credit hours (16 weeks per semester, approximately 45 contact hours)
- Textbook:**
- 1- Introduction to Robotics: Mechanics and Control” by John Craig, 4th edition, 2018.
 - 2- Introduction to Autonomous Mobile Robots by R. Siegwart and I. Nourbakhsh, 2004
- References**
- 1- Modern Robotics: Mechanics, planning, and control Kevin M. Lynch and Frank C. Park, 2017
 - 2- Robotics Modelling Planning and Control, L. Villani, Springer, 2009.
 - 3- Introduction to Robotics by Saha, 2nd edition 2014.
- Useful Websites:**
- <https://petercorke.com/toolboxes/robotics-toolbox/>
<https://www.mathworks.com/help/robotics/>
<http://www.roboanalyzer.com/>
- Description:** This course introduces the field of robotics to the undergraduate students. The main topics in Robotic Manipulators will be discussed in details, namely, forward kinematics, inverse kinematics, Jacobians and dynamics. Introduction to mobile robots locomotion, kinematics and sensors.
- Website:** <https://www.philadelphia.edu.jo/academics/mabumallouh/>
- Instructor:** Dr. Ahmad Al-Mahasneh
- Email:** amahasneh@philadelphia.edu.jo
- Office:** Engineering building, room E 406.

Course Outlines:

Week	Topic
(1)	Introduction to Robotics
(2, 3)	Robot manipulator: Spatial Descriptions and Transformations
(4, 5, 6)	Forward Manipulator Kinematics (DH Parameters)
(7, 8, 9)	Inverse Manipulator Kinematics
(10, 11)	Differential Kinematics (Jacobian Matrix) and Singularity
(12, 13)	Dynamics of Manipulator and control
14	Introduction to mobile robots

15	Locomotion and sensors
16	Kinematics

Course Learning Outcomes with reference to ABET Student Outcomes:

Upon successful completion of this course, student should:

1.	Understand the types and main concepts of robotics.	[1]
2.	Understand the mathematical modeling of robots.	[1]
3.	Simulate and analyze of robotic systems using software (i.e. MATLAB)	[1]
4.	Ability to search and summarize a robotic subject that was not covered deeply in the course	[7]

Assessment Guidance:

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

Midterm Exam: Midterm exam will cover about 8-weeks of lectures.

Others (HW, Quizzes, project): Students will be given homework assignments and Quizzes during this course.

Final Exam: The students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

Grading policy:

Midterm Exam	30%
Others (HW, Quizzes, project)	30%
Final Exam	40%
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Total:	100%

Attendance Regulation:

The semester has in total 45 credit hours. Total absence hours from classes and tutorials must not exceed 15% of the total credit hours. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from sitting the final exam and a zero mark will be recorded for the course. If the excuse is approved by the deanship the student will be considered withdrawn from the course.