

Robotics
Syllabus of (Ph.D) Postgraduate (2024-2025)
The course of Control and Computer Engineering
Course Instructor: Assist Prof. Dr. Muna Hadi Saleh

Subjects: Two hours for each lecture	No. of week
Historical Development, Robot Components, Link, Joint, Manipulator, Wrist, End-effector, Actuators. Sensors, Controller, Robot Classifications, Geometry, Workspace, Actuation, Control, Application, Introduction to Robot's Kinematics, Dynamics, and Control.	1
Kinematics, Rotation Kinematics, Orientation Kinematics, Motion Kinematics, Forward Kinematics, Inverse Kinematics.	3
Numerical Methods in Kinematics, Linear Algebraic Equations, Matrix Inversion, Nonlinear Algebraic Equations, Jacobian Matrix from Link Transformation Matrices.	3
Path Planning, Cubic Path, Polynomial Path, Non-Polynomial Path Planning, Manipulator Motion by Joint Path, Cartesian Path, Rotational Path, Manipulator Motion by End-Effector Path.	3
Machine Vision System, The Basics of Vision Technology, How Vision Applications Work, Dimensional Gaging, Assembly Verification, Flaw Detection, Print Verification, Code Reading	1
Sensing and Control, Vision-based Robot Control, Camera Imaging, and Geometry.	1
Seminar	1
Exam-1	1
Exam-2	1
Total	15

References:

1. Bruno Siciliano, Oussama Khatib (Eds.), "Springer Handbook of Robotics," _c Springer-Verlag Berlin Heidelberg 2008
2. B. Siciliano and K.P. Valavanis (Eds),"Control Problems in Robotics and Automation," Springe, 1998 pp 177-205
3. Roland Siegwart and Illah R. Nourbakhsh," Introduction to Autonomous Mobile Robots", 2004 pp272-319
4. Reza N. Jazar, "Theory of Applied Robotics Kinematics, Dynamics, and Control," Second Edition, c Springer Science + Business Media, LLC 2006, 2010