Faculty of Engineering & Technology

Robot Mechanics

Information :

Course Code :	MKT 471	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Mechatronics Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	10
Teaching Assistant	Donia Waheed Mohamed Abdelmonem Saleem	

Area Of Study :

1. Analyze rigid motion with coordinate transform.
2. Derive robot manipulator kinematics, and use DH convention.
3. Solve simple inverse kinematics problems.
4. Solve robot motion planning problems.

Description :

Robotics overview and applications; Robot sensors and actuators, Robotic technolo-gy and systems; Kinematic Modeling: Spatial Representations and Transformations; DH and Homogenous transformations; Forward and inverse Kinematics; Jacobian for velocities and static analysis; Problem solving using up to date standard S/W ro-botics tools (Matlab); implementing the right industrial robotics system for a plant.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	a1. Define robot terminology and taxonomy.
2 -	a2. Explain the Denavit-Hartenberg, DH convention for axis transformation
b.Intellectual Skills: :	
1 -	b1. Analyse the forward kinematics of robot chain and build homogenous
2 -	b2. Derive inverse kinematics of serial robot chains.
3 -	b3. Compute the trajectory of robot end effector.
c.Professional and Practical Skills: :	
1 -	c1. Use the suitable software for analysis of robot kinematics.
2 -	c2. Select right robot type for a motion application need.
d.General and Transferable Skills: :	
1 -	d1. Manage tasks, time, and resources.
2 -	d2. Search for information and engage in life-long self-learning discipline
3 -	d3. Collaborate effectively within multidisciplinary team.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction		4	0
Rigid motion		4	2
Forwards kinematics		4	6
Inverse kinematics		4	6
Jacobian matrix and singularity		4	4
Trajectory and path planning		4	
Project discussion		2	
Project presentation		2	

Teaching And Learning Methodologies :

Interactive Lecturing
Problem solving
Discussion
Experiential learning
Project
Research

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final Exam	40.00		
First Midterm	15.00	6	
Participation and Assessments	10.00		
Project	10.00	15	
Project Proposal	10.00	5	
Second Midterm	15.00	11	

Recommended books :

1. Asaada, H. and Slotine, J.-J E. Robot Analysis and Control, John Wiley, 1986, 3rd Edition.
2. Groover, M.P., Weiss, M., Nagel, R.N., and Odrey, N.G. Industrial Robotics: Technology, Programming, and Applications, McGraw Hill, 1986.
3. Fu, K.S., Gonzalez, R.C., and Lee, C.S.G. Robotics: Control, Sensing, Vision, and Intelligence, McGraw Hill, 1986.
4. Megahed, S.M., Robotics: Principles of Robot Modelling and Simulation, John Wiley, 1993.