COURSE NUMBER	**ME 431**
COURSE TITLE	**Introduction to Robotics and Automation**
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits)
COURSE COORDINATOR	Z. Ji
COURSE DESCRIPTION	Introduction to mechanics and control of robotic manipulators. Topics include spatial transformations, kinematics, dynamics, trajectory generation, actuators and control, and relations to product design and flexible automation.
PREREQUISITE(S)	MECH 236 – Dynamics CIS 101 –Computer Programming and Problem Solving
COREQUISITE(S)	None
REQUIRED , ELECTIVE, OR SELECTED ELECTIVE	Elective
REQUIRED MATERIALS	John J. Craig, Introduction to Robotics: Mechanics and Control, 3rd Ed., Prentice-Hall, 2005.
Other supplemental materials (not Required)	None
COMPUTER USAGE	MATLAB software

COURSE LEARNING OUTCOMES/ EXPECTED PERFORMANCE CRITERIA:

Course Learning Outcomes	SOs*	Expected Performance Criteria
1. relate various robot structures to the characteristics of their workspace.	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
2. perform spatial transformations associated with rigid body motions	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
3. perform kinematics analysis of robot systems	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
4. understand the singularity issues associated with the operation of robotic systems	a, e, k	Exam Question (80% of the students will earn a grade of 70%

			or better on this question)
	5. perform basic calculation associated with trajectory planning	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)
	6. understand basic issues associated with robot control	a, e, k	Exam Question (80% of the students will earn a grade of 70% or better on this question)

CLASS TOPICS

1. Robot Structure and Workspace
2. Spatial Transformations
3. Orientation Matrices
4. Forward Kinematics
5. Inverse Kinematics
6. Jacobian and Singularities
7. Trajectory Generation
8. Robot Controller

STUDENT OUTCOMES (SCALE: 1-3)

a	b	c	d	e	f	g	h	i	j	k
3				2						2

3 – Strongly supported 2 – Supported 1 – Minimally supported

* Student Outcomes