

		National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM				
Programme		Bachelor of Technology in Computer Science and Engineering										Academic Year of Regulation			2018-19		
Department		Computer Science and Engineering										Semester			VII		
Course Code	Course Name	Credit Structure				Marks Distribution											
		L	T	P	C	INT	MID	END	Total								
CS 429	Robotics and Automation	3	0	0	3	50	50	100	200								
Course Objectives	To introduce the knowledge in basic models of robot and their workspace.	Course Outcomes	CO1	Able to acquire knowledge about the basic concepts explain the fundamentals of robotics and its components													
	To introduce the concepts of Robotic system, its components and instrumentation and control related to robotics.		CO2	Able to identify the electrical, electronics and mechanical components and use of them design or machine elements and transmission system.													
	To be able to demonstrate knowledge of the relationship between mechanical structures of industrial robots and their workspace.		CO3	Able to design the workspace of control mechanism of robot.													
	To provide and illustrate the movement of robotic joints with computers/microcontrollers.		CO4	Able to understand the features and operation of robotic automation.													
	To be able to discuss and explain sensors and instrumentation in robotics		CO5	Students will able to use and implement the robot programming software.													
No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	
1	CO1	2	1	0	1	0	0	0	0	2	0	0	0	3	0	3	
2	CO2	1	1	0	1	0	0	0	0	2	0	0	0	2	0	2	
3	CO3	1	2	3	1	2	0	0	0	0	0	0	0	2	3	2	
4	CO4	0	2	3	0	2	2	3	0	2	0	0	1	2	3	2	
5	CO5	0	2	3	0	2	2	0	0	2	0	0	1	3	3	3	
SYLLABUS																	
No.	Content													Hours	COs		
I	Introduction to Robotics and Automation Automation and robotics, Robot anatomy, Basic structure of robots, Resolution, Accuracy and repeatability, and Classification and Structure of robots, Point to point and continuous path systems.													07	CO1 CO2		
II	Robotic System and Control Systems: Components of robotic system, Hydraulic systems, d.c. servo motors, Basic control systems concepts and models, Control system analysis, Robot activation and feedback components. Positional and velocity sensors, actuators. Power transmission systems,													08	CO2 CO3		
III	Robot arm Kinematics and Dynamics: Robot joints, The direct kinematics problem, The inverse kinematics solution, Lagrange-Euler formation, Generalized D'Alembert equations of motion, Denavit Hartenberg convention and its applications.													08	CO2 CO3		
IV	Sensors and Instrumentation in robotics: Tactile sensors, proximity and range sensors, Force and torque sensors, Uses of sensors in robotics. Vision equipment, Image processing, Concept of low level and high level vision. Computer based Robotics: Method of robots programming, GUI based robotic arm control, Interfacing with computer, communication and data processing, Introduction to Artificial Intelligence.													06	CO4 CO3 CO4		
V	Computer based Robotics: Method of robots programming, GUI based robotic arm control, Interfacing with computer, communication and data processing, Introduction to Artificial Intelligence.													07	CO4 CO5		
Total Hours													36				
Essential Readings																	
1. Robotics & Control, By R.K. Mittal & I.J. Nagrath, TMH, 2007																	
2. Introduction to Robotics – Analysis, Systems and Application, By Saeed B. Niku, PHI 2006																	
3. Fundamentals of Robotics: Analysis and Control, By Criag, J., Prentice–Hall of India Private Limited 2006.																	
Supplementary Readings																	
1. Automation, Production Systems and Computer Integrated Manufacturing, By M.P.Grover, Pearson Education																	
2. Robotics Engg-an Integrated Approach, By Richard D, Klafter, Thomason A Chmiel Owski, Michel Nagin, PHI 2005																	
3. Fundamentals of Robotics: Analysis and Control, By Schilling. R. J., Prentice Hall of India Private Limited 2006.																	