B51RO Robotic Mechanical Systems

COURSE DETAILS
Course Code: B51RO
Full Course Title: Robotic Mechanical Systems
SCQF Level: 11
SCAF Credits: 15
Available as Elective: No

DELIVERY LEVEL
Undergraduate: Yes  Postgraduate Taught: Yes  Postgraduate Research: Yes
Additional Information:

COURSE AIMS
This course aims to

- provide advanced knowledge and skills in robot kinematics with the focus on the simulation of kinematic motion.
- provide advanced knowledge and skills for robot analysis and design with a focus on static analysis, dynamics and design
- introduce fundamental mechatronic design
- introduce recent advances in a current robotic topic

LEARNING OUTCOMES – SUBJECT MASTERY
On completion of this course, students will be able to:

- select and design appropriate architecture(s) of robots to satisfy the motion requirement for a number of applications.
- perform the motion analysis of robots.
- simulate the motion of robots using CAD software.
- formulate the instantaneous kinematic equations for a variety of robots
- identify singular configurations of robots
- formulate the static and dynamic equations for a variety of robots
- simulate the motion of robots as a whole using software
- design a robot, with a focus on the mechanical design, for specified applications from the mechatronic perspective
- apply recent advances in one of current robotic topics to analysis and design

LEARNING OUTCOMES – PERSONAL ABILITIES
On completion of this course, learners will be able to:
- design creatively the mechanical system of a robot or other mechatronic systems involving motion
- work effectively in a group
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• be aware of the importance of new technology, people and culture on overall business performance and their impact on upstream engineering process such as design.

SYLLABUS

Classification of robots

• 3D modelling and motion simulation of robots
• Direct kinematics
• Inverse kinematics
• Workspace analysis
• Instantaneous kinematics
• Singularity
• Static analysis
• Dynamics
• Control
• Trajectory generation
• Simulation
• Robot design
• Repeatability and accuracy
• Recent advances in a current robotic topic

COURSE RELATIONSHIPS

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LOCATION AND ASSESSMENT METHODS

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