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

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<th>Postgraduate Research:</th>
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**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
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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<th>Course Code</th>
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LOCATION AND ASSESSMENT METHODS

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