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
• 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

LOCATION AND ASSESSMENT METHODS

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