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| QF01/0408-4.0E | Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department |
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| Study plan No. | 2021/2022 | University Specialization | Artificial Intelligence |
| Course No. | 0142351 | Course name | Robotics |
| Credit Hours | 3 hours | Prerequisite Co-requisite | |
| Course type | <input type="checkbox"/> MANDATORY UNIVERSITY REQUIREMENT <input type="checkbox"/> UNIVERSITY ELECTIVE REQUIREMENTS | <input type="checkbox"/> FACULTY MANDATORY REQUIREMENT <input type="checkbox"/> Support course family requirements | <input checked="" type="checkbox"/> Mandatory requirements <input type="checkbox"/> Elective Requirements |
| Teaching style | <input type="checkbox"/> Full online learning | <input type="checkbox"/> Blended learning | <input checked="" type="checkbox"/> Traditional learning |
| Teaching model | <input type="checkbox"/> 2 Synchronous: 1asynchronous | <input type="checkbox"/> 2 face to face : 1synchronous | <input checked="" type="checkbox"/> 3 Traditional |

Faculty member and study divisions' information (to be filled in each semester by the subject instructor)

| Name | Academic rank | Office No. | Phone No. | E-mail | |
|-----------------|---------------|------------|--------------------|----------------|----------------|
| | | | | | |
| | | | | | |
| Division number | Time | Place | Number of students | Teaching style | Approved model |
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Brief description

The goal of this course is to provide basic knowledge of Robotic systems the applications related to them. The course will cover the following topics: types and classifications of robots, degrees of freedom, robot dynamics and kinematics, robot sensors and vision applications, robotic actuator systems, basic control systems for robots, embedded systems and artificial intelligence in robotic systems. Arduino kits, servo motors and different sensors are used to design 3 DoF manipulators and rovers

Learning resources

| | | | | | |
|---|--|-------------------------------|---|---------------------------------|--|
| Course book information (Title, author, date of issue, publisher ... etc) | 1- Modern Robotics, Mechanics, Planning, and Control, Kevin M. Lynch, 2019 2- Introduction to Robotics, Niku Saeed, Willy, 2017 | | | | |
| Supportive learning resources (Books, databases, periodicals, software, applications, others) | 1. Fundamentals of Robotics by D.K. Pratihari Narosa Publishing House Pvt. Ltd., New Delhi, 2017. | | | | |
| Supporting websites | | | | | |
| The physical environment for teaching | <input checked="" type="checkbox"/> Class room | <input type="checkbox"/> labs | <input type="checkbox"/> Virtual educational platform | <input type="checkbox"/> Others | |
| Necessary equipment and software | Zoom, Python, ARDUINO | | | | |
| Supporting people with special needs | ----- | | | | |
| For technical support | ----- | | | | |

Course learning outcomes (S= Skills, C= Competences K= Knowledge,)

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| No. | Course learning outcomes | The associated program learning output code |
|--------------------|--|---|
| Knowledge | | |
| K1 | Understand different types of robots. | MK3 |
| K2 | Learn about Kinematics and inverse kinematics . | MK3 |
| Skills | | |
| S1 | Applying Python or Arduino to program the robot component. | MS3 |
| S2 | Applying position movement and rotational matrix using python or arduino. | MS3 |
| Competences | | |
| C1 | Design of a robot that perform simple tasks | MC1 |

Mechanisms for direct evaluation of learning outcomes

| Type of assessment / learning style | Fully electronic learning | Blended learning | Traditional Learning (Theory Learning) | Traditional Learning (Practical Learning) |
|--|---------------------------|------------------|--|---|
| First exam | 0 | 0 | %20 | 0 |
| Second / midterm exam | %30 | %30 | %20 | 30% |
| Participation / practical applications | 0 | 0 | 10 | 30% |
| Asynchronous interactive activities | %30 | %30 | 0 | 0 |
| final exam | %40 | %40 | %50 | 40% |

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, and work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Schedule of simultaneous / face-to-face encounters and their topics

| Week | Subject | learning style* | Reference ** |
|------|-----------------------------------|-----------------|-----------------------|
| 1 | Fundamental | Lectures | Handouts + Text books |
| 2 | Fundamental | Lectures | Handouts + Text books |
| 3 | Kinematics of Robots | Lectures | Handouts + Text books |
| 4 | Kinematics of Robots | Lectures | Handouts + Text books |
| 5 | Kinematics of Robots | Lectures | Handout and lab notes |
| 6 | Kinematics of Robots | Lectures | Handout and lab notes |
| 7 | Differential Motion | Lectures | Handouts + Text books |
| 8 | Differential Motion | Lectures | Handouts + Text books |
| 9 | Sensors | Lectures | Handouts + Text books |
| 10 | Actuators | Lectures | Handouts + Text books |
| 11 | Motors and Drivers | Lectures | Handouts + Text books |
| 12 | Motion Control | Lectures | Handouts + Text books |
| 13 | Robot Vision | Lectures | Handouts + Text books |
| 14 | Robot Vision | Lectures | Handouts + Text books |
| 15 | Artificial intelligence in Robots | Lectures | Handouts + Text books |
| 16 | Final Exam | | |

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.