# Faculty of Engineering & Technology

## Robot Control

## Information :

| **Course Code :** | MKT 472 | **Level** | : | Undergraduate | **Course Hours :** | 3.00- Hours |
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**Department :** Specialization of Mechatronics Engineering

## Instructor Information :

| Title | Name | Office hours |
|---|---|---|
| Professor | Osama Esmail Mahmoud Esmail | 1 |

## Area Of Study :

· Develop the students knowledge about different methods for path planning for robot manipulators.
· Prepare students to apply different methods for controlling robot manipulators, including Fuzzy Logic Control.
· Develop the students knowledge about control of manipulators.
· Train students to design, simulate, build, and test a robot manipulator.

## Description :

Path and trajectory planning; Manipulator dynamics; Independent joint control; Force control; Geometric nonlinear control; Computer vision; Visual servo control; Fuzzy control; Robot control system design; Problem solving using up-ﾛﾒﾆﾑﾔﾄﾊﾆﾆﾄﾅ ﾕﾌﾌ ﾛﾒ ﾊﾒﾔ ﾅﾌ ﾒﾒﾅ ﾑﾒ ﾅﾒﾅﾊﾅ É

## Course outcomes :

### a.Knowledge and Understanding: :

| 1 - | Define different terms used in classic and Fuzzy Logic Control. |
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| 2 - | List different methods for path planning of manipulators. |
| 3 - | Explain Different methods for control robot manipulators. |
| 4 - | Describe manipulator dynamics and computer vision. |

### b.Intellectual Skills: :

| 1 - | Analyze manipulators' dynamics. |
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| 2 - | Calculate parameters for a smooth trajectory, and optimum parameters for classic and fuzzy controllers of manipulators. |
| 3 - | Select suitable parameters for robot controllers. |
| 4 - | Analyze the results of different controllers for manipulators. |

### c.Professional and Practical Skills: :

| 1 - | Analyze lab experimental results of control manipulators with different control methods. |
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| 2 - | Use the suitable hardware components and software for drafting and implementing a simple manipulator. |
| 3 - | Apply knowledge of mathematics, science, information technology, design and engineering practice integrally to identify, formulate and solve engineering and field problems related to Robot manipulators. |
| 4 - | Prepare technical reports and presentations. |

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| d.General and Transferable Skills: : | |
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| 1 - | Search for information and engage in life-long self-learning. |

## Course Topic And Contents :

| Topic | No. of hours | Lecture | Tutorial / Practical |
|---|---|---|---|
| Path and trajectory planning | 10 | 4 | 6 |
| Manipulator dynamics; Independent joint control | 8 | 4 | 4 |
| Force control | 8 | 4 | 4 |
| Geometric nonlinear control | 8 | 4 | 4 |
| Computer vision; Visual servo control | 10 | 6 | 4 |
| Fuzzy control | 8 | 4 | 4 |
| Robot control system design | 8 | 4 | 4 |

## Teaching And Learning Methodologies :

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| Interactive Lecturing |
| Problem solving |
| Experiential learning |
| Discussion |
| Project |
| Research |

## Course Assessment :

| Methods of assessment | Relative weight % | Week No | Assess What |
|---|---|---|---|
| Assignment | 5.00 | | |
| Final Exam | 40.00 | | |
| Mid- Exam 1I | 15.00 | | |
| Mid- Exam I | 15.00 | | |
| Project | 10.00 | | |
| Quizzes | 10.00 | | |
| Research | 5.00 | | |

## Course Notes :

2. Lecture notes on the course Moodle page, FUE website.

## Recommended books :

3. Recommended Readings: S. B. Niku, "Intruduction to Robotics, analysis, control, applications". John Wily and Son, 2nd edition

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