FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

## Faculty of Engineering & Technology

## Mechanical Design (2)

**Information :**

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| **Course Code :** | MAN 441 | **Level :** | Undergraduate | **Course Hours :** | 3.00- Hours |

**Department :** Department of Mechanical Engineering

**Instructor Information :**

| Title | Name | Office hours |
|---|---|---|
| Lecturer | Mohamed Ahmed Mahmoud Abdelwahab | |
| Teaching Assistant | Christopher Nashaat Najib Benjamin | |

**Area Of Study :**

Enrich the studentôs understanding of the design of different mechanical elements.
Develop the studentôs ability to apply the different design principles on power transmission system.
Enhance the studentôs ability to integrate the different design principles in a group design project where they use computer aided design software.

**Description :**

Design of Mechanical Elements: Gears (spur, helical, bevel and worm gears). Clutches, Brakes, Couplings, Flywheels. Design of Flexible Mechanical Elements (Belts, Chains, Flexible shafts). Mechanical springs, Power transmission, Bearings (Rolling-contact bearing, journal Bearing). Case studies, Use of interactive computer programs for problem solving, Group design project.

**Course outcomes :**

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| **a.Knowledge and Understanding: :** | |
| 1 - | Explain the different types of mechanical elements such as gears, flexible mechanical elements, clutches, brakes, couplings, flywheels, springs and bearings. |
| 2 - | Interpret the different forces associated with the different mechanical elements. |
| 3 - | Explain the design principles for the different mechanical elements. |
| 4 - | Illustrate the use of computer aided design programs such as solid works to draft different mechanical components. |
| **b.Intellectual Skills: :** | |
| 1 - | Analyze the forces on different mechanical elements. |
| 2 - | Design of gear trains |
| 3 - | Design of flexible mechanical elements |
| 4 - | Apply the design principles on a power transmission case study. |
| **c.Professional and Practical Skills: :** | |
| 1 - | Draft mechanical elements and assemblies on CAD software such as Solid-Works. |
| 2 - | Utilize Solid-Works software capabilities for power transmission project. |

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| 3 - | Apply design principles and procedures on an engineering design project. |
| **d.General and Transferable Skills: :** | |
| 1 - | Work in a group project |
| 2 - | Submit on time assignments and project. |
| 3 - | Utilize computer aided drafting software such as Solid Works |
| 4 - | Present the project in a technical report. |

**Course Topic And Contents :**

| Topic | No. of hours | Lecture | Tutorial / Practical |
|---|---|---|---|
| Introduction to Mechanical Engineering Design | 2 | 2 | 0 |
| Solid Works tutorials (Drafting, and assembly) | 10 | 0 | 10 |
| Gears (Spur, bevel, helical and worm gears) Fundamental, gear trains, and force analysis | 12 | 12 | 0 |
| Flexible Mechanical Elements Belts (Flat, V, timing and metal) | 4 | 4 | |
| Introduction to Rolling-contact bearing | 2 | 2 | 0 |
| Introduction to Journal Bearing | 2 | 2 | |
| Introduction to Mechanical Springs | 2 | 2 | 0 |
| Introduction to Clutches, brakes, coupling and flywheels | 2 | 2 | 0 |
| Introduction to power transmission (gearbox) | 2 | 2 | 0 |
| Project follow up and Presentation | 8 | 2 | 6 |

**Teaching And Learning Methodologies :**

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

**Course Assessment :**

| Methods of assessment | Relative weight % | Week No | Assess What |
|---|---|---|---|
| 1 st -Mid-term | 15.00 | 6 | |
| 2 nd -Mid-term | 15.00 | 11 | |
| Attendance and class participation | 10.00 | | |
| Final Exam | 40.00 | 16 | |
| Project | 10.00 | 14 | |
| Quizzes | 10.00 | | |