FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

## Faculty of Engineering & Technology

### Thermal Analysis

**Information :**

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|---|---|---|---|---|---|
| **Course Code :** | PHY 401 | **Level :** | Undergraduate | **Course Hours :** | 3.00- Hours |

**Department :** Department of Petroleum Engineering

**Instructor Information :**

| Title | Name | Office hours |
|---|---|---|
| Associate Professor | Ahmed Mohamed Farag Abdelbary | 6 |
| Associate Professor | Ahmed Mohamed Farag Abdelbary | 6 |
| Assistant Lecturer | Moustafa Raafat Aziz Shousha | |
| Teaching Assistant | Mostafa Hesham Mahmoud Naim | |

**Area Of Study :**

 Enrich students' knowledge about Heat Transfer.
 Train students' to perform experiments related to thermal analysis of different engineering systems.
 Prepare students' for the practical filed in the work market of Mechanical Engineering.

**Description :**

Basics of thermal analysis and heat transfer concepts using the FEA environment of Solid Works Simulation. The importance of thermal analysis, transient and steady state analyses, Conduction, Convection, Radiation and the thermal simulation process. Analyzing thermal effects on models.

**Course outcomes :**

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| **a.Knowledge and Understanding: :** | |
| 1 - | Demonstrate the use of studied Physics and Fluid Mechanics in our course. |
| 2 - | Associate the difference between the words "Heat" and "Temperature". |
| 3 - | Distinguishes between sensible heat and latent heat with applications. |
| 4 - | Distinguishes between different heat transfer mechanisms; Conduction, Convection and Thermal Radiation. |
| 5 - | Describe the importance of using Fins in heat transfer devices. |
| 6 - | Distinguishes between steady and transient applications in heat transfer. |
| 7 - | List the factors affecting the heat transfer convection coefficient. |
| **b.Intellectual Skills: :** | |
| 1 - | Solve different engineering problems related to Heat Transfer. |
| 2 - | Analyse different system types found in nature. |

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| 3 - | Deduce Heat equations. |
| **c.Professional and Practical Skills: :** | |
| 1 - | Evaluate the performance of thermal devices. |
| 2 - | Practice basic experiments on Heat Transfer. |
| 3 - | Follow up safety requirements at experimental work and observe the appropriate steps to manage risks. |
| 4 - | Analyse experimental results. |
| 5 - | Write a technical report on a project or an assignment. |
| **d.General and Transferable Skills: :** | |
| 1 - | Write a technical report on a project or an assignment. |
| 2 - | Refer to relevant literatures. |

**Course Topic And Contents :**

| Topic | No. of hours | Lecture | Tutorial / Practical |
|---|---|---|---|
| Introduction to Heat Transfer | 9 | 6 | 3 |
| Conduction Heat Transfer | 10 | 6 | 4 |
| Extended Surfaces (Fins) | 12 | 6 | 6 |
| Transient Heat Conduction | 9 | 6 | 3 |
| Introduction to Convection | 6 | 3 | 3 |
| External Forced Convection | 9 | 6 | 3 |
| Internal Forced Convection | 11 | 6 | 5 |
| Free Convection | 9 | 6 | 3 |

**Teaching And Learning Methodologies :**

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| Lecture |
| Problem solving |
| Laboratory experiments |
| Research activity |

**Course Assessment :**

| Methods of assessment | Relative weight % | Week No | Assess What |
|---|---|---|---|
| Assignments | 5.00 | | |
| Final Exam | 40.00 | | |
| Lab. Exper. | 5.00 | | |
| Mid- Exam I | 15.00 | | |
| Mid- Exam II | 15.00 | | |
| Oral Exam | 5.00 | | |
| Participation | 5.00 | | |
| Quizzes | 5.00 | | |

| **Recommended books :** |
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| Yunus A. Çengel, John M. Cimbala, Fluid Mechanics – Fundamentals and Applications, 2010. |