**University:** Benha University

**Faculty:** Faculty of Engineering at Shoubra

**Department offering the program:** Mechanical Engineering Department

**Department offering the course**: Mechanical Engineering Department

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| **1- Course Data** |  |  |  |  |
| **Course Code:** **MEP191** |  | **Course Title:** Thermodynamics 1 |
| **Specialization:** Mechanical Production Engineering |  | **Course Type:** Compulsory |  | **Study Year:** first year |
| **Teaching Hours:** Lecture: 3 |  |  | Tutorial/ Practical: 2 |  | Total: 5 |

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| **2-  Course objectives**  |
| **For students undertaking this course, the aims are to:** |
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| 1. Acquire theories and concepts in thermodynamics fields.
 |
| 1. Identify the definitions of parameters related to the thermodynamics.
 |
| 1. Study and use the properties of saturated water vapor and gases.
 |
| 1. Apply the fundamentals of thermodynamics ( first and second laws of thermodynamics)
 |
| 1. Illustrate and understand the definitions of entropy.
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| **3- Course competencies** |
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| **Level (A) Engineering Competencies** |
| On completing this course, students will be able to demonstrate the knowledge and understanding of: 1) Concepts and theories of the mechanical production engineering related to thermo dynamic.**(A1)** |
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| **Level (B) Mechanical Engineering Competencies** |  |
| At the end of this course, the students will be able to:1) Select appropriate solutions for engineering problems related to thermodynamics. (**B1**)2) Assess and evaluate the characteristics and performance of components, systems and processes related to thermodynamic field(**B5**) |  |
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| **Level (C) Mechanical Production Competencies** |  |
| On completing this course, the students are expected to be able to: |  |
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| c.1) Manage problems related to thermal equipment.  |

(**C5**) |  |
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**4- Course Contents**

1. **Course Description**

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| --- | --- |
| **Week no.** | **Topics** |
| 1 | Fundamental Definitions  |
| 2 | Fundamental Concepts  |
| 3 | Thermodynamic processes and cycles |
| 4 | Thermodynamic properties of the working Fluids |
| 5 | Application on thermodynamic properties of the working Fluids |
| 6 | Work and heat |
| 7 | Applications on work and heat |
| 8 | The first law of the thermodynamics |
| 9 | Applications on the first law of the thermodynamics |
| 10 | The second law of the thermodynamics |
| 11 | Applications on the second law of the thermodynamics |
| 12 | Entropy |
| 13 | Irreversibility and Availability |

1. **topics to be Covered weekly & Matrix of Competencies**

|  |  |  |
| --- | --- | --- |
| Week | Topics  | Course Competencies |
| A1 | B1 | B5 | C5 |
| 1 | Fundamental Definitions  | **√** | **√** | **√** |  |
| 2 | Fundamental Concepts  |  **√** | **√** | **√** |  |
| 3 | Thermodynamic processes and cycles | **√** | **√** | **√** | **√** |
| 4 | Thermodynamic properties of the working Fluids | **√** | **√** | **√** | **√** |
| 5 | Application on thermodynamic properties of the working Fluids | **√** |  | **√** | **√** |
| 6 | Fundamental Definitions  | **√** | **√** | **√** | **√** |
| 7 | Applications on work and heat | **√** | **√** | **√** | **√** |
| 8 | The first law of the thermodynamics | **√** |  | **√** | **√** |
| 9 | Applications on the first law of the thermodynamics | **√** | **√** | **√** |  |
| 10 | The second law of the thermodynamics | **√** | **√** | **√** |  |
| 11 | Applications on the second law of the thermodynamics | **√** | **√** | **√** |  |
| 12 | Entropy | **√** | **√** | **√** |  |
| 13 | Irreversibility and Availability | **√** | **√** | **√** |  |

**5- a) Teaching and Learning Methods**

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| --- | --- |
| **Course Competencies** | **Teaching and Learning Methods** |
| Face-to-face Lecture | Online Education | Tutorial / Exercise | Group Discussions | Laboratory | Site Visit | Presentation | Mini Project | Research and Reporting | Brain Storming  |
| **Level A** | A1 | **√** | **√** | **√** |  |  |  |  |  |  |  |
| **Level B** | B1 | **√** | **√** | **√** |  |  |  |  |  |  | **√** |
| B5 | **√** | **√** | **√** |  |  |  |  |  |  | **√** |
| **Level C** | C5 | **√** | **√** | **√** |  |  |  |  |  |  | **√** |

**5- b) Teaching and Learning Methods of Disables**

 None

**6- Student Academic Counseling and Support**

* Students are directed to contact teaching staff for academic support during specific office hours.
* Regarding this course, I will be available for students for two hours a week as indicated on my time table declared for students from the beginning of the semester.

**7- Student Assessment**

**a- Student Assessment Methods**

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| --- | --- |
| **Course Competencies** | **Assessment Methods** |
| Written Exams | Online Exams | Oral Exam | Quizzes |  Lab Exam | Take-Home Exam | Research Assignments | Reporting Assignments | Project Assignments | In-class Questions |
| **Level A** | A1 | **√** |  | **√** |  |  |  |  | **√** |  | **√** |
| **Level B** | B1 | **√** |  |  | **√** |  |  |  | **√** |  | **√** |
| B5 | **√** |  |  | **√** |  |  |  | **√** |  | **√** |
| **Level C** | C5 | **√** |  |  |  |  |  |  | **√** |  | **√** |

**b- Assessment Schedule and Weight**

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| --- | --- | --- |
| **Assessment** | **Week** | **Weight** |
| Midterm Examination | 7 | 20 % |
| Final Term Examination | (As Schedule) | 60 % |
| Oral Examination | 12 | 10 % |
| Semester Work | 2, 4, 8, 11 | 10% |
| **Total** |  | **100** % |

**8- Facilities**

The following facilities are needed for this course:

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| --- | --- | --- | --- | --- | --- |
| ■ | Classroom | □ | Smart Board | □ | Computer with software |
| □ | Lecture Hall | □ | White Board | □ | MIS system |
| ■ | Sound and Microphone | ■ | Data Show | □ | Internet Access |
| □ | Other: ………………… |  |  |  |  |

**9- List of References**

**a- Course Notes**

Lectures Notes in PDF

**b- Books**

1. Yunus A. Cengel and Michael A. Boles, “Thermodynamics, an Engineering Approach" 8th Edition, 2014.

**c- Recommended Books**

1. Van Wylen, G. Sonntag R. and Borgnakke, C. Fundamentals of Classical Thermodynamics, John Wiley & Sons, Inc. 4th edition.

**d- Web Sites**

[http://www.bu.edu.eg/staff/](http://www.bu.edu.eg/staff/ahmedhussein3-courses/15061/files)

**10- Matrix of Course Objectives and Competencies**

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| --- | --- |
| **Course Objectives** | **Course** **Competencies** |
| A1 | B1 | B5 | C5 |
| Course Objective #1 | **√**  |  |  |  |
| Course Objective #2 | **√** | **√** | **√** |  |
| Course Objective #3 |  |  | **√** | **√** |
| Course Objective #4 |  | **√** |  | **√** |

**- Course Coordinator:**

**Prof. Dr. Ragab Khalil Ali Signature:**

 **Dr. Ali Soluman**

**- Program Coordinator:**

Prof. Dr. Ramadan Sakr **Signature:**