1. **Basic Information:**

|  |  |
| --- | --- |
| **Program Title** | Civil Engineering |
| **Department Offering the Program** | Civil Engineering department |
| **Department Responsible for the Course** | Basic Science and Engineering |
| **Course Title** | Engineering Thermodynamics |
| **Course Code** | ENG 202 |
| **Year/Level** | 2nd level |
| **Specialization** | Major |
| **Authorization Date of Course Specification** |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Teaching hours** | **Lectures** | **Tutorial** | **Practical** |
| **2** | **2** | **0** |

1. **Course Aims:**

|  |  |
| --- | --- |
| **No.** | **Aims** |
| 1 | Apply knowledge of mathematics, science and engineering concepts to understand the energy transfer concept between different systems and it`s applications. |

1. **Intended Learning Outcomes (ILO’S):**
2. **Knowledge and understanding:**

|  |  |
| --- | --- |
| **No.** | **Knowledge and understanding** |
| **A1** | Define the concepts and theories of mathematical, science necessary for engineering systems analysis, Energy transfer and general system analysis, properties of a pure substances, energy analysis of closed systems, mass and energy analysis of control volumes, the second law of thermodynamics. |
| **A4** | State the principles of system design including elements design, process and including elements, processes, and system related to disciplines, Energy transfer and general system analysis, properties of a pure substances, mass and energy analysis of control volumes, the second law of thermodynamics. |

1. **Intellectual Skills:**

|  |  |
| --- | --- |
| **No.** | **Intellectual Skills** |
| B2 | Think creatively to select the appropriate solutions for engineering problems and system design, gas power cycles, vapor cycles. |

1. **Professional Skills:**

|  |  |
| --- | --- |
| **No.** | **Professional Skills** |
| **C2** | Merge engineering knowledge and understanding to improve design, products and services, gas power cycles, vapor cycles. |

1. **General Skills:**

|  |  |
| --- | --- |
| **No.** | **General Skills** |
| D3 | Communicate effectively |

**4. Course Contents:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Topics** | **Lectures** | **Tutorial** | **Practical** |
| **1** | **Fundamental concepts - Properties of a pure substance** | **2** | **2** |  |
| **2** | **Equation of state - thermodynamic systems - Work and heat** | **2** | **2** |  |
| **3** | **First law of thermodynamics; Applications to Systems and Control Volumes** | **6** | **6** |  |
| **4** | **Second Law of Thermodynamics; Principle of Carnot cycles** | **4** | **4** |  |
| **5** | **Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy** | **4** | **4** |  |
| **6** | **Applications to systems and control volumes - Irreversibility and availability** | **6** | **6** |  |
| **7** | **Power and refrigeration cycles** | **4** | **4** |  |
| **Total** | | **28** | **28** |  |

**5. Teaching and learning methods:**

|  |  |
| --- | --- |
| **No.** | **Teaching Methods** |
| 1 | Lectures |
| 2 | Discussion sessions |
| 3 | Information collection from different sources |
| 4 | Research assignment |

**6. Teaching and learning methods for disable students:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Teaching Methods** | **Reason** |
| 1 | Presentation of the course in digital material. | Better access any time |
| 2 | Web communication with students. | Better communication with  certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

7**. Student evaluation:**

**7.1 Student evaluation method**:

|  |  |  |
| --- | --- | --- |
| **No.** | **Evaluation Method** | **ILO’s** |
| 1 | Midterm examination | A1, A4 |
| 2 | Semester work | C2, D6 |
| 3 | Final term examination | A1, A4, B2, C2,D6 |

**7.2 Evaluation Schedule:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Evaluation Method** | **Weeks** |
| 1 | Midterm examination | 08th |
| 2 | Semester work | 2nd ,7th,9th,14th |
| 3 | Final term examination | 15th |

**7.3 weighting of Evaluation:**

|  |  |  |
| --- | --- | --- |
| **No.** | **evaluation method** | **Weights** |
| 1 | Mid-term examination | 20% |
| 2 | final examination | 60% |
| 3 | Semester work | 20% |
|  | Total | 100% |

**8. List of References:**

|  |  |
| --- | --- |
| **No.** | **Reference List** |
| **1** | Haber man, William L., and James EA John. Engineering thermodynamics. Allyn and Bacon, 1980. |
| **2** | Cengel, Yunus A. Introduction to thermodynamics and heat transfer. New York: McGraw-Hill, 1997. |
| **3** | Bergman, Theodore L., and Frank P. Incropera. Introduction to heat transfer. John Wiley & Sons, 2011. |

**9. Facilities required for teaching and learning:**

|  |  |  |
| --- | --- | --- |
| **No.** | **Facility** |  |
| 1 | Lecture classroom |  |
| 2 | Presenter |  |
| 3 | White board |  |
| 4 | Data show system |  |

**10. Matrix of knowledge and skills of the course:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Topic** | **Aims** | **Knowledge and understanding** | **Intellectual Skills** | **Professional Skills** | **General Skills** |
| **1** | **Fundamental concepts - Properties of a pure substance** | **1** | **A1 ,A4** | **B2** | **C2** | **D6** |
| **2** | **Equation of state - thermodynamic systems - Work and heat** | **1** | **A1 ,A4** | **B2** | **C2** | **D6** |
| **3** | **First law of thermodynamics; Applications to Systems and Control Volumes** | **1** | **A1 ,A4** | **B2** | **C2** | **D6** |
| **4** | **Second Law of Thermodynamics; Principle of Carnot cycles** | **1** | **A1** | **B2** | **C2** | **D6** |
| **5** | **Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy** | **1** | **A1** | **B2** | **C2** | **D6** |
| **6** | **Applications to systems and control volumes - Irreversibility and availability** | **1** | **A1** | **B2** | **C2** | **D6** |
| **7** | **Power and refrigeration cycles** | **1** | **A1** | **B2** | **C2** | **D6** |

**Course Coordinator: Dr. A. E. Kabeel**

**Head of Department: Prof. Dr. Mohammed Saad Elkady**

**Date of Approval: Jan.2017**