ABET Course Syllabus for MET 314: Applied Thermodynamics

1. Course number and name: MET 314: Applied Thermodynamics

2. Credits and contact hours: 4 credit hours, 4 hours per week

3. Instructor's Name: Dr. Jeunghwan "John" Choi

4. Textbook, title, author, and year:
   - Cengel*, Fundamentals of Thermal-Fluid Sciences, 5e*

   a. Other supplemental materials:
      - Software for Internet access,
      - Word processing,
      - Spreadsheet,
      - Graphing capability required.

5. Specific course information:
   a. Brief description of the content of the course (catalog description): Properties of pure substances, first and second laws of thermodynamics, enthalpy and entropy, perfect gases, Carnot cycle, steam cycles, refrigeration cycles, mixtures of perfect gases, chemical reactions, and combustion. Four hours lecture per week.

   b. Pre-requisites: MATH 173 with C or higher and (PHYS 112 or PHYS 182) with a C+ or higher and (CHEM 111 or CHEM 181). Co-requisite: MET 314LAB.

   c. Required, elective, or selected elective (as per Table 5-1) course in the program: Required

6. Specific goals for the course:
   Learn the thermodynamic concepts.

   a. Specific outcomes of instruction:
      - Select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly defined engineering technology activities.
      - Select and apply knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies.
      - Conduct standard tests and measurements; conduct, analyze, and interpret experiments; and apply experimental results to improve processes.
      - Perform effectively as a member of a technical team.
      - Identify, analyze, and solve broadly defined engineering technology problems.
      - Apply written, oral, and graphical communication in both technical and non-technical environments; and identify and use appropriate technical literature.
      - Assess impact of engineering technology solutions in a societal and global context.

- Select, set-up, and calibrate instruments and prepare laboratory reports and documents the development, installation, or maintenance of mechanical components and systems.
- Analyze problems related to thermal sciences, such as thermodynamics, fluid mechanics, heat transfer, etc.

b. Criterion 3 student outcomes addressed by course:
3 (1)

7. Brief list of topics covered:
   - Properties, States, and Process
   - Energy, Heat, & Work
   - First Law of Thermo
   - Ideal Gas Laws
   - System Boundaries, Energy Balance
   - Second Law of Thermo
   - Carnot Cycles
   - Air Standard Cycles
   - Ideal Otto, Diesel, & Brayton Cycles
   - Ideal Rankine Cycles, Steam, & Refrigeration
   - Gas Mixture, Partial pressures
   - Air, Relative Humidity, Wet Bulb Temperature
   - Psychrometric Charts

ABET Course Syllabus for MET 314: Applied Thermodynamics Laboratory

1. Course number and name: MET 314: Applied Thermodynamics Laboratory

2. Credits and contact hours: 1 credit hours, 2 hours per week

3. Instructor's Name: Dr. Jeunghwan "John" Choi

4. Textbook, title, author, and year:
   - Cengel*, Fundamentals of Thermal-Fluid Sciences, 5e*

   a. Other supplemental materials:
      - Software for Internet access,
      - Word processing,
      - Spreadsheet,
      - Graphing capability required.

5. Specific course information:
   a. Brief description of the content of the course (catalog description): Properties of pure substances, first and second laws of thermodynamics, enthalpy and entropy, perfect gases, Carnot cycle, steam cycles, refrigeration cycles, mixtures of perfect gases, chemical reactions, and combustion. Four hours lecture per week.

   b. Pre-requisites: MATH 173 with a grade of C or higher and (PHYS 112 or PHYS 182) with a grade of C+ or higher and (CHEM 111 or CHEM 181).

   c. Required, elective, or selected elective (as per Table 5-1) course in the program: Required

6. Specific goals for the course:
   Apply thermodynamic concepts.

   a. Specific outcomes of instruction:
      - Interpret the practical aspects of thermodynamics by relating theory to various applications of energy conversions systems.
      - Analyze refrigeration and air conditioning systems.
      - Examine terminology in the energy conversion technical field in order to read, discuss and comprehend the relevant literature.
      - Predict and measure the performance of energy conversion systems.
      - Plan and conduct energy conversion experiments.
      - Perform computerized data analysis and be able to present and explain experimental results with clarity.
      - Write various types of test reports common in the engineering field.

   b. Criterion 3 student outcomes addressed by course:
      3 (1)

7. Brief list of topics covered:
    - Properties, States, and Process
    - Energy, Heat, & Work
    - First Law of Thermo
    - Ideal Gas Laws
    - System Boundaries, Energy Balance
    - Second Law of Thermo
    - Carnot Cycles
    - Air Standard Cycles
    - Ideal Otto, Diesel, & Brayton Cycles
    - Ideal Rankine Cycles, Steam, & Refrigeration
    - Gas Mixture, Partial pressures
    - Air, Relative Humidity, Wet Bulb Temperature
    - Psychrometric Charts