

**BOROUGH OF MANHATTAN COMMUNITY COLLEGE**

City University of New York

**Department of Science**

**Title of Course THERMODYNAMICS I**

**ESC 221 Section \_\_\_\_\_**

**Credits 3**

**Class hours 4**

**Lab hours (if applicable)**

**Instructor Information**

**Name:**

**Office:**

**Room:**

**Email:**

**Course Description**

This course covers introductory concepts and definitions that include Absolute Temperature, Work, Heat, First Law and applications, Second Law, Carnot Theorem, Entropy, Thermodynamic state variable and functions, Reversibility, irreversibility, ideal Gas Mixtures, Mixtures of vapor and gas, Humidity calculations.

**Prerequisites/Co-requisites**

Prerequisites: CHE 210 and PHY 225

Corequisites: MAT 303 Or Departmental Approval

**Student Learning Outcomes**

Students will be able to learn the fundamental concepts of thermodynamics needed for engineering.

**Required Text & Readings**

Title: Thermodynamics, an Engineering Approach 5<sup>th</sup> Edition

Author: Cengel, Y. and Boles, M.

**Other Resources**

**Use of Technology (if applicable)**

**Evaluation & Requirements of Students**

There are three hourly examinations final examination, homework and project assignments.

**Outline of Topics**

**LECTURE SYLLABUS**

**WEEK**

**TOPIC**

- |      |  |
|------|--|
| 1    | Introduction, definition & terminology temperature scales and the zeroth law of thermodynamics.                        |
| 2, 3 | Properties of pure substance, phase diagrams, tables of thermodynamics properties and the ideal gas equation of state. |
| 4    | Work and Heat.   |
| 5    | The first law of thermodynamics, internal energy, enthalpy.  |
| 6    | Specific heats, energy relation for ideal gases.   |
| 7, 8 | Conservation of mass, first law for an open system, SSSF, Joule-Thompson coefficient and USUF.                         |

- 9 Heat engine and refrigerators, second law of thermodynamics, reversibility Carnot cycle, Carnot theorems and consequences.
- 10 Clausius inequality,, entropy, irreversibility.
- 11 Principle of increase of entropy, entropy change for ideal gases, polytropic and isentropic process.
- 12T The Second law for open systems, efficiency.
- 13 Thermodynamics Property Relations.
- 14 Mixture of ideal gases, gas vapor mixture, humidity calculation.

### **College Attendance Policy**

At BMCC, the maximum number of absences is limited to one more hour than the number of hours a class meets in one week. For example, you may be enrolled in a three-hour class. In that class, you would be allowed 4 hours of absence (not 4 days). In the case of excessive absences, the instructor has the option to lower the grade or assign an F or WU grade.

### **Academic Adjustments for Students with Disabilities**

Students with disabilities who require reasonable accommodations or academic adjustments for this course must contact the Office of Services for Students with Disabilities. BMCC is committed to providing equal access to all programs and curricula to all students.

### **BMCC Policy on Plagiarism and Academic Integrity Statement**

Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own creation. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations to the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism.

Students who are unsure how and when to provide documentation are advised to consult with their instructors. The library has guides designed to help students to appropriately identify a cited work. The full policy can be found on BMCC's web site, [www.bmcc.cuny.edu](http://www.bmcc.cuny.edu). For further information on integrity and behavior, please consult the college bulletin (also available online).