Course Title: Thermodynamics I
Course Prefix: CHEG
Course No.: 2043
Section No.: P01

Department of Chemical Engineering

Instructor Name: Kazeem B. Olanrewaju, Ph.D.
Office Location: Room 201C, CL Wilson Engineering Building
Office Phone: 936-261-9415; 319-594-1861 (cell)
Fax: 936-261-9419
Email Address: kaolanrewaju@pvamu.edu
U.S. Postal Service Address: Prairie View A&M University
P.O. Box 519
Mail Stop 2525
Prairie View, TX 77446

Office Hours: T 2:00 pm – 5:00 pm. You can also contact me by email or telephone.
Virtual Office Hours: By email

Course Location: Lecture: Juvenile Justice Building 336
Recitation: New Electrical Engineering Bldg 117

Class Meeting Days & Times: Lecture: Mondays and Wednesdays 3:30 p.m. – 4:50 p.m.
Recitation: Monday 5:30 PM to 6:20 PM

Catalog Description: (3-0) Credit 3 semester hours. Introduction to Chemical Engineering
Calculations. PVT Properties of Fluids. Equations of State. First and Second Law of
Prerequisites: CHEM 1034 (or 1043) and PHYS 2513. Calculus is an implied prerequisite.
Co-requisites: NONE

Required Text: Introduction to Chemical Engineering Thermodynamics, J. M. Smith, H. c. Van Ness and M.

Recommended Text/Readings: NONE

PVAMU Library:
phone: (936) 261-1500;
web: http://www.tamu.edu/pvamu/library/

University Bookstore:
phone: (936) 261-1990;
web: https://www.bkstr.com/Home/10001-10734-1?demoKey=d

Course Goals or Overview:
The goal of the course is to introduce to the students the concept of energy and entropy. The
first and second law of thermodynamics with applications to real processes and cycles are
emphasized. Carnot theorem is derived and efficiency concept illustrated. Equations of state
of pure substances such as van der Waals, general cubic, and Virial are discussed in detail.
The applications of efficiency and laws of thermodynamics to turbines, pumps, refrigerators,
avtomobiles and combined cycle power plants are discussed in detail.

Course Outcomes/Objectives
At the end of this course, the student will
1. Be able to apply knowledge of mathematics, science and engineering
2. Be able to identify, formulate and solve engineering problems
3. Be able to use the skills, techniques, and modern engineering tools for engineering practice

Course Requirements & Evaluation Methods

Students will be evaluated based on their performance on class examinations, homework, and quizzes. ABET Criteria 3(a), and 3(e) would be measured for this course.

Grading Matrix

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercises, In-Class and Out-of-Class Assignments</td>
<td>For practice</td>
</tr>
<tr>
<td>Attendance and participation</td>
<td>10</td>
</tr>
<tr>
<td>Homeworks/Projects</td>
<td>40-45</td>
</tr>
<tr>
<td>In-Class Tests/Midterm Exam/Take Home Exam</td>
<td>20-25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Grade Determination:
A = 100 – 90%;
B = 89 – 80%;
C = 79 – 70%;
D = 69 – 60%;
F = 59% or below

Course Procedures

Homework Policy
Homework problems will be solely for practice to get students ready for the class quizzes and tests.

Exam Policy
Exams should be taken as scheduled. No makeup examinations will be allowed except under documented emergencies (See Student Handbook).

At my discretion, additional (optional) assignments/tests may be given for extra credit. PLEASE DO NOT USE SOLUTION MANUAL. The penalty is treated as plagiarism.

*subject to change at discretion of instructor
<table>
<thead>
<tr>
<th>Week</th>
<th>Chapter</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1: Introduction</td>
<td>Dimensions and Units, Measures of amount or Size, Force, Temperature, Pressure, Work, Energy, Heat</td>
</tr>
<tr>
<td>5</td>
<td>3: Volumetric Properties of Pure Fluids</td>
<td>Cubic Equations of State, Generalized Correlations for Gases, Generalized Correlations for Liquids</td>
</tr>
<tr>
<td>7</td>
<td>4: Heat Effects</td>
<td>Standard Heat of Combustion, Temperature Dependence of (\Delta H^\circ), Heat Effects of Industrial Reactions</td>
</tr>
<tr>
<td>9</td>
<td>SPRING BREAK</td>
<td>SPRING BREAK</td>
</tr>
<tr>
<td>11</td>
<td>6: Thermodynamic Properties of Fluids</td>
<td>Property Relations for Homogeneous Phases, Residual Properties, Residual Properties by Equations of State, Two-Phase Systems</td>
</tr>
<tr>
<td>12</td>
<td>6: Thermodynamic Properties of Fluids</td>
<td>Thermodynamic Diagrams, Tables of Thermodynamic Properties, Generalized Property Correlations for Gases</td>
</tr>
<tr>
<td>13</td>
<td>7: Applications of Thermodynamics to Flow Processes</td>
<td>Duct Flow of Compressible Fluids, Turbines, Compression Processes</td>
</tr>
<tr>
<td>14</td>
<td>8: Production of Power From Heat</td>
<td>The Steam Power Plant, Internal-Combustion Engines, Jet Engines, Rocket Engines</td>
</tr>
<tr>
<td>15</td>
<td>9: Refrigeration and Liquefaction</td>
<td>The Carnot Refrigerator, The Vapor-Compression Cycle, The Heat Pump,</td>
</tr>
<tr>
<td>16</td>
<td>Review &amp; Final Exam</td>
<td>Mark your calendar! TBD</td>
</tr>
</tbody>
</table>
University Rules and Procedures

Disability statement (See Student Handbook):
Students with disabilities, including learning disabilities, who wish to request accommodations in class should register with the Services for Students with Disabilities (SSD) early in the semester so that appropriate arrangements may be made. In accordance with federal laws, a student requesting special accommodations must provide documentation of their disability to the SSD coordinator.

Academic misconduct (See Student Handbook):
You are expected to practice academic honesty in every aspect of this course and all other
courses. Make sure you are familiar with your Student Handbook, especially the section on academic misconduct. Students who engage in academic misconduct are subject to university disciplinary procedures.

**Forms of academic dishonesty:**

1. **Cheating:** deception in which a student misrepresents that he/she has mastered information on an academic exercise that he/she has not mastered; giving or receiving aid unauthorized by the instructor on assignments or examinations. Academic misconduct: tampering with grades or taking part in obtaining or distributing any part of a scheduled test.

2. **Fabrication:** use of invented information or falsified research.

3. **Plagiarism:** unacknowledged quotation and/or paraphrase of someone else's words, ideas, or data as one's own in work submitted for credit. Failure to identify information or essays from the Internet and submitting them as one's own work also constitutes plagiarism.

**Nonacademic misconduct (See Student Handbook):**

The university respects the rights of instructors to teach and students to learn. Maintenance of these rights requires campus conditions that do not impede their exercise. Campus behavior that interferes with either (1) the instructor's ability to conduct the class, (2) the inability of other students to profit from the instructional program, or (3) campus behavior that interferes with the rights of others will not be tolerated. An individual engaging in such disruptive behavior may be subject to disciplinary action. Such incidents will be adjudicated by the Dean of Students under nonacademic procedures.

**Sexual misconduct (See Student Handbook):**

Sexual harassment of students and employers at Prairie View A&M University is unacceptable and will not be tolerated. Any member of the university community violating this policy will be subject to disciplinary action.

**Attendance Policy:**

Prairie View A&M University requires regular class attendance. Excessive absences will result in lowered grades. Excessive absenteeism, whether excused or unexcused, may result in a student's course grade being reduced or in assignment of a grade of “F”. Absences are accumulated beginning with the first day of class.

**Student Academic Appeals Process**

Authority and responsibility for assigning grades to students rests with the faculty. However, in those instances where students believe that miscommunication, errors, or unfairness of any kind may have adversely affected the instructor's assessment of their academic performance, the student has a right to appeal by the procedure listed in the Undergraduate Catalog and by doing so within thirty days of receiving the grade or experiencing any other problematic academic event that prompted the complaint.