ME 301—Course Information and Policies

Course  ME 301 Thermodynamics II
Room: ET 107
Time: 6:00–7:15 T Th

Instructor  Donald W. Mueller, Jr., Ph.D., P.E.
Office: ET 321J
Hours: 9:15–10:15 M T Th F & 4:30–5:30 T Th†
Phone: (260) 481-5707
Email: don.mueller@ipfw.edu
Web: http://www.etcs.ipfw.edu/~mueller

Description  Reversibility, availability, power cycles, and the conversion of heat into work; combustion, heat pumps, refrigeration, and air conditioning

Text  Fundamentals of Thermodynamics, 8th ed., Wiley
Borgnakke and Sonntag

Prerequisite  ME 200 – Thermodynamics I

Topics  
1. Review of Thermodynamics
2. Exergy
3. Rankine Cycle and Cycle Improvements
4. Gas Power Cycles
5. Refrigeration and Heat Pump Cycles
6. Mixtures
7. Air Conditioning and Psychrometrics
8. Combustion

Homework  Ten homework assignments will be collected and graded (see the class schedule). Please start each problem on a new sheet of paper, write neatly, and clearly indicate your final numerical answers. Copying is not permitted and will result in a zero. Typically, homework will be due one week from the day on which it was assigned. No late homework will be accepted. Supplementary problems are listed on the class schedule. You are expected to work these problems, but they will not be collected. The solutions to these problems will be posted on my webpage.

Projects  Two projects will be assigned during the semester. These projects will cover topics in a somewhat open-ended manner and will probably require some computer usage. A brief technical memo summarizing your work will be required. A penalty will be assessed if projects are submitted late—no projects will be accepted three days after the due date.

Exams  There will be three in-class, closed-book/closed-note exams. You will be allowed to use the Thermodynamics Notes from the FE Handbook and provided equation sheets and tables. The FE notes are located on my webpage and at the NCEES website (www.ncees.org). Please download and print a copy. Do not write on these notes.

Final Exam  There will be a comprehensive final exam on Tuesday, Dec. 13 from 5:45–7:45 p.m. The final will consist of five or six problems—problems similar to those on the in-class exams. Your grade on the final exam will be used to replace your lowest exam score if doing so improves your average.

†Please stop by anytime that I am in my office.
Grades  

Averages will be based on the following distribution:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Homework</td>
<td>5%</td>
</tr>
<tr>
<td>Projects</td>
<td>10%</td>
</tr>
<tr>
<td>Exams</td>
<td>60%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Grades will be assigned in accordance with the following criteria:

\[ A \geq 90\%, \quad 89\% > B \geq 80\%, \quad 79\% > C \geq 70\%, \quad 69\% > D \geq 60\%, \quad F < 59\% \].\(^\dagger\)

With the plus/minus grading system, the following grades are also available for assignment in this class: A–, B±, C±, and D±. These grades will be used to differentiate performance if warranted.

Policies  

As a courtesy to the instructor and other students, do not be late for class and turn off your cell phone.

No late homework. Late projects will be penalized—no projects accepted three days after the due date.

Consult the student handbook for information pertaining to a grade appeal or grievance policies.

Many services are available to students. The Center for Academic Support and Advancement (CASA) offers tutoring in KT G23. Personal Counseling Services (373-8060) are available to students in Walb 210. Students with a disability in need of assistance should contact the SSD office in Walb 113 (481-6658 or www.ipfw.edu/ssd) for a description of services available.

Comments  

Thermodynamics is a very important engineering topic. Thermodynamics II builds heavily on the material from Thermodynamics I.

If you like thermal science courses, you should plan to take ME 421–Heating, Ventilation, and Air Conditioning I, ME 424–Design and Optimization of Thermal Systems, and/or ME 427–Sustainable Energy Sources and Systems.

Please feel free to stop by any time if you have any comments or suggestions. I truly am interested in what you think about the course. Any suggestions that will benefit the class are appreciated, and I will try my best to address any concerns that you might have.

If you do not feel comfortable discussing matters with me, feel free to speak to Dr. Nash Younis, Chair of the Department of Civil and Mechanical Engineering.

\(^\dagger\)These are maximum cut-offs.
ME 301—Course Description

Description
Reversibility, availability, power cycles, and the conversion of heat into work; combustion, heat pumps, refrigeration, and air conditioning

Outcomes
A student who successfully fulfills the course requirements will be able to:

1. Understand the concepts of availability and irreversibility. (a,e)
2. Analyze power producing cycles. (a,e)
3. Analyze refrigeration and heat pump cycles. (a,e)
4. Apply the first and second law of thermodynamics to gas mixtures. (a,e)
5. Analyze psychrometric systems. (a,e)
6. Apply the first and second law of thermodynamics to reacting systems. (a,e)
7. Calculate the adiabatic flame temperature. (a,e)
8. Design a thermodynamic system and report the results. (c,e,g,k)

Program Outcomes
Engineering programs must demonstrate that their graduates have:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.