ME 540 Intermediate Thermodynamics (4 credits/Lecture)

Instructor:
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Office Hours: TBD
Prerequisites: ME 312, equivalent or instructor approval

Course Description:
This is a graduate level course where students are expected to master classical thermodynamics by way of solving extended problems using software tools. Statistical thermodynamics concepts are also introduced and exercised.

Measurable Student Learning Outcomes:
By the end of this course, students must demonstrate the ability to:

1. Demonstrate a firm understanding of fundamental classical thermodynamics.
2. Collaboratively calculate solutions to steady state and transient problems using software tools.
3. Translate between classical thermodynamic and statistical thermodynamic models.
4. Demonstrate awareness of the current state of the field of thermodynamics, including active research areas.

Course content:
- First law
- Second law
- Finite time thermodynamics
- Availability
- Chemical reactions
- Higher order equations of state
- Statistical thermodynamics

Learning Resources:

Optional texts for reference: Thermodynamics: An Engineering Approach, by Yunus Cengel, Michael Boles, 8th Ed.

Fundamentals of Engineering Thermodynamics, by Michael J. Moran, Howard N. Shapiro Daisie D. Boettner, Margaret B. Bailey

Course Materials: Engineering Equation Solver (EES, pronounced 'ease') software, MATLAB
**Course Website:**
All notes, assignments and other reference material will be posted on the course website in Canvas. Communication will also be conducted through Canvas, and students are required to check announcements frequently, or setup Canvas to deliver announcements via email, text message or whichever format you prefer.

**COURSE POLICIES**

**Evaluation of Student Performance:**
A final course grade will be determined using the following breakdown:

<table>
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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Team Homework Assignments</td>
<td>30%</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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**Evaluation of Student Performance:**
Grading is based on decade scale (A 100-90, B 89-80, C 79-70, D 69-60, F 59-0).

**Other related references:**
Advanced Thermodynamics for Engineers, by Wark Kenneth, Jr., (Intermediate)
Thermal Physics, by Charles Kittel, Herbert Kroemer, 2nd Edition, (Physics based)
Fundamentals of Thermodynamics, by Claus Borgnakke, Richard E. Sonntag, 7th Ed. (Intermediate)

**Academic Dishonesty and Expectations for Student Conduct**
Student conduct is governed by the university’s policies. Specific offenses, including offenses for academic or scholarly dishonesty under the student conduct code, are listed at [http://studentlife.oregonstate.edu/studentconduct/offenses-0](http://studentlife.oregonstate.edu/studentconduct/offenses-0). Please carefully review this information for an understanding of the university’s definition of cheating, fabrication, assisting, tampering, plagiarism, and so forth.

**Statement Regarding Students with Disabilities**
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at [http://ds.oregonstate.edu](http://ds.oregonstate.edu). DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.
Each student is responsible for the material covered during lecture. It is the responsibility of each student to remain informed of the course schedule and topics covered. Lectures are designed to supplement the reading material, not to repeat or replace it. Although attendance during lectures is not required, it is highly recommended. Examples, concepts developed in class (not covered in detail in the textbook) may be part of quizzes/projects. Class time is intended to be interactive and include the use of class discussions, and class participation in solving problems.

The instructor will not respond to long or detailed questions asked via e-mail/phone. Only minor questions will be answered. If no e-mail response is received, students are responsibility to clarify any questions during class hours, office hours or additional scheduled appointments.

Class Schedule and Tentative Canvas Modules (Homework, lecture handouts, handouts, videos, link, etc.)

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<thead>
<tr>
<th>Week 1</th>
<th>Software Tools</th>
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<tr>
<td>Week 2</td>
<td>Equilibrium</td>
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<td>Transient Systems</td>
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<td>Week 4</td>
<td>Energy Conversion</td>
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<td>Week 5</td>
<td>Chemical Reactions</td>
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<td>Week 6</td>
<td>Availability</td>
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<td>Week 7</td>
<td>Higher Order Equations of State</td>
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<td>Week 8</td>
<td>Statistical Thermodynamics</td>
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<td>Week 9</td>
<td>Statistical Thermodynamics</td>
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<tr>
<td>Week 10</td>
<td>Review</td>
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