San José State University  
Mechanical Engineering Department  
ME 113: Thermodynamics – Section 2, Fall 2015

Course and Contact Information

Class Days/Time: Mondays & Wednesdays, 8:40-10:20 AM  
Classroom: ENG 401  
Prerequisites: Phys 52, and Math 32, with a C- or better in each  
Instructor: Prof. Kathryn Gosselin  
Office Location: ENG 310C  
Telephone: 408-924-8354 (email is better)  
Email: kathryn.gosselin@sjsu.edu  
Office Hours: 2:00-3:00 PM Mondays, 10:30-11:30 AM Tuesdays, or by appointment

Canvas and Course Messaging

I will use Canvas to post course materials such as this syllabus, homework assignments, exam review material, PowerPoint presentations, and so on. I will also post grades on this website as they are available, so check them early and often. This system also has discussion (forum) and chat (instant message) functions. You are encouraged to use these functions to discuss particularly onerous homework problems.

To use Canvas, go to http://sjsu.instructure.com and log in with your 9-digit SJSU ID and password (the same you use for SJSUOne). If you have any questions about using Canvas, please visit http://www.sjsu.edu/at/ec/canvas/student_resources/index.html.

I will occasionally send messages to the class through Canvas. You can (and probably should!) set up your account to forward all Canvas messages to an email address that you check regularly.

Course Description

This class covers properties of simple compressible substances, ideal gas and other equations of state, and the first and second laws of thermodynamics. Power cycles, refrigeration cycles, gas mixtures, and gas-vapor mixtures are also included.

Course Learning Outcomes

Upon completion of this course, student should be able to
1. Discuss the causes of ozone depletion and global warming and the uncertainty involved in making long-term environmental predictions.  
2. Discuss basic thermodynamic terms, such as enthalpy, entropy, specific and relative humidity, dew point, and adiabatic saturation and wet-bulb temperatures, in simple enough terms that someone outside the field of thermodynamics could understand what they are.
3. Understand how energy transfer processes (heat and work) affect the thermodynamic state of pure substances. This involves the ability to
   a. Use tabulated data, equations of state, and the computer program EES to determine the phase and properties (temperature, pressure, specific volume, internal energy, enthalpy and entropy) of a pure substance.
   b. Analyze the thermodynamic performance (i.e., calculate work or heat input or output, mass flow rates, and first and second law efficiencies) of common steady-flow engineering devices such as pumps, compressors, turbines, nozzles and diffusers, expansion valves, heat exchangers, and mixing chambers using the first and second laws of thermodynamics and the conservation of mass.
   c. Apply the first law of thermodynamics to simple unsteady-flow problems.
   d. Explain physical aspects of the first and second law of thermodynamics, and apply them in solving real engineering problems.

4. Understand the operation of basic energy conversion devices and be able to analyze their performance, including calculation of work, heat input or output, mass flow rates, and first law efficiencies. This involves the ability to
   a. Analyze the performance of a simple Otto cycle and Diesel cycles
   b. Analyze the performance of a simple Brayton cycle and one with regeneration.
   c. Analyze the performance of a simple Rankine cycle and one with reheating and regeneration.
   d. Analyze the performance of a simple vapor compression cycle.
   e. Use EES to model and optimize thermodynamic cycles.

5. Understand engineering systems involving non-reacting mixtures and be able to analyze their thermodynamic performance. This involves the ability to
   a. Calculate properties of ideal and real gas mixtures.
   b. Explain why condensation forms using technical terms.
   c. Analyze different air-conditioning and cooling processes involving air-water vapor mixtures.

Required Texts/Readings

Textbook

The textbook for this course is the 8th edition of *Thermodynamics: An Engineering Approach*, by Çengel and Boles. The 5th-7th editions are also acceptable, as are e-books. The custom version from the bookstore will save you money, and it comes bundled with an access code for the online system.

Other Readings

We will use McGraw-Hill's online homework system, called Connect, in this class. If you purchase the textbook at the bookstore, it comes bundled with an access code to Connect. If you purchase your own textbook, you'll need to also purchase Connect access separately at a cost of $77. You can also get a two week free trial and convert it at the end of the trial, if you prefer. Purchasing ConnectPlus instead also includes access to the e-book.

To log in to Connect, go to this website: [http://connect.mheducation.com/class/me113-f15-gosselin-section2](http://connect.mheducation.com/class/me113-f15-gosselin-section2). I will also place this link on Canvas so that you don't have to type it in.

Course Requirements and Assignments

Expected Time Commitment

SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of forty-five hours for each unit of credit (normally three hours per unit per week), including preparing for class,
participating in course activities, completing assignments, and so on. More details about student workload can be found at [http://www.sjsu.edu/senate/docs/S12-3.pdf](http://www.sjsu.edu/senate/docs/S12-3.pdf).

Effort and course performance are strongly correlated. I don't give A's for effort, but putting the time and energy into homework, learning, and studying for this class will give you a much better chance of performing well. You should plan to spend 2-3 hours outside of class for every hour of class; for a 4-credit class such as this one, you should expect to spend 8-12 hours outside of class each week. Some students may spend more or less time than this, but this is a good guideline. How you spend this time is dependent on how you best learn, but I would suggest reviewing your notes, reading pertinent sections of the book, doing or redoing homework problems, completing LearnSmart activities (discussed subsequently), and studying for exams.

**Class Attendance**

NOTE that University policy F69-24 at [http://www.sjsu.edu/senate/docs/F69-24.pdf](http://www.sjsu.edu/senate/docs/F69-24.pdf) states that “Students should attend all meetings of their classes, not only because they are responsible for material discussed therein, but because active participation is frequently essential to insure maximum benefit for all members of the class. Attendance per se shall not be used as a criterion for grading.”

Attendance will not be counted toward your grading, but I strongly encourage you to attend every class. Like effort, class attendance strongly correlates with performance. Attending class allows you to hear supplementary explanations that may help you more than the book, to practice solving problems with immediate feedback, and to ask questions about things you do not understand. This kind of interaction is invaluable.

If you are unable to attend class for any reason, you are responsible for making up any missed assignments, notes, and quizzes. I will post all class PowerPoints on Canvas, but I do not hand out copies of any supplementary notes I write on the board. The final page of this greensheet lists the corresponding book sections for each lecture; this is a good place to start if you have missed class.

**Grading Policy**

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<thead>
<tr>
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<tbody>
<tr>
<td>Homework</td>
<td>93.0-100</td>
<td>90.0-92.9</td>
<td>84.0-86.9</td>
<td>80.0-83.9</td>
<td>74.0-76.9</td>
<td>70.0-73.9</td>
<td>60.0-69.9</td>
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<td>Essay</td>
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<td>Quizzes (4@ 4% each)</td>
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<td>Midterms (2@20% each)</td>
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<td>Final Exam</td>
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<td>Extra Credit</td>
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An exceptional final exam (10% higher than your average score going into the final) may result in a grade slightly higher than what is shown here. **No extra credit** beyond what is discussed in this greensheet will be made available.

*As will be discussed subsequently, you must pass the essay and the two “Gateway Quizzes” with a grade of 70% or higher in order to pass this course. Inability to do so will result in a grade of zero for the class.*
Note that “All students have the right, within a reasonable time, to know their academic scores, to review their grade-dependent work, and to be provided with explanations for the determination of their course grades.” See University Policy F13-1 at http://www.sjsu.edu/senate/docs/F13-1.pdf for more details.

Homework
There will be 16 assignments – 12 regular assignments and 4 done in class. Regular homework will be assigned every week, and it will be due the Wednesday of the following week at 5:00 PM unless otherwise announced. Homework is turned in via the McGraw-Hill Connect website. Some assignments will require you to scan and upload a solution done by hand, so make sure that you find a place to do this. These uploads must be *.doc, *.docx, or *.pdf files. Cell phone cameras typically do not provide sufficient resolution; it is your responsibility to make sure that the scanned document is legible. If you are unable to scan and upload these files, you may turn them in during class on Tuesday mornings rather than submitting them online.

In-class assignments are due at the beginning of the following class period, although you are welcome to turn them in early. These assignments will be posted on Canvas – if you miss class, you are responsible for downloading the assignment, completing it, and turning it in on the due date. The amount of homework assigned in this course is considered a starting point – the minimum necessary to understand the material. The book has hundreds of problems if you need more practice.

For problems done by hand, please include the following:
- List your name, date, and homework assignment number at the top of your assignment.
- Summarize the problem statement before beginning each problem. Give enough information that you could return to this problem a month or a year from now and understand what it is asking without looking up the problem in the book.
- Drawing a figure may be helpful as well, particularly on more complex problems.
- List all assumptions.
- Write down all equations in symbolic form first, before plugging in numbers.
- Write units next to all equations! This will keep you from making mistakes. If you learn nothing else from this class, please learn to keep track of your units.

No late homework will be accepted without a university-authorized excuse; however, the two lowest homework scores will be dropped. You may consider these assignments “freebies,” if you wish, but use them wisely!

EES Modeling
In addition to regular, handwritten homework assignments, some assignments will require the use of Engineering Equation Solver (EES). This software is available to all students free of charge, and it can also be found on all the computers in the department's computer labs (E213/215). Unfortunately, it does not work on OS X (Macs). A short tutorial will be conducted during class time. This software is a simultaneous equation-solver with thermophysical properties built in, and it can be used to solve complicated thermodynamics problems and optimize systems.

Copying another student's EES model or allowing another student to copy yours constitutes plagiarism and will result in a grade of 0 for the given assignment.

Gateway Essay
One short essay related to a contemporary environmental issue will also be assigned. This essay is a “Gateway Assignment”, and it must be passed with a 70% or better in order to pass the class. If you don't pass the
first time, you will be allowed to revise and resubmit. However, the best grade you can get after resubmission is a 70%.

Copying your essay from another student or from a book or website (I read Wikipedia too, you know!) constitutes plagiarism and will result in a grade of 0 for the assignment. As this is a Gateway Assignment, this will result in you failing the course.

**Quizzes**

Four quizzes will be given in class. Some of them may be open book, so remember to bring your textbooks to class! If you use an e-book, please let me know ASAP so that we can figure out a solution. The best way to study for these quizzes is to do the assigned homework and make sure that you understand it completely, including all physical concepts and definitions.

The first two quizzes are “Gateway Quizzes.” You MUST pass these quizzes with a score of 70% or better to pass ME 113. You may take the quiz several times. The score you achieve the first time you take the quiz will count toward your class average. If you do not pass the first time, you make retake the quiz via Canvas. You must re-take it until you achieve a grade of 70% or better. These quizzes cover material absolutely necessary to pass the class. If you do not pass a make-up quiz before the next midterm exam, you will receive a failing grade for the class. Three versions of each Gateway Quiz will be available on Canvas. If you fail the first two re-takes, you must meet with me for a tutoring session before making a third attempt. Give yourself plenty of time to complete this before the next exam; this is especially critical for the second Gateway Quiz, which comes the week before the first exam.

**Exams**

There will be two midterm exams in this course, as well as a cumulative final exam. These will be discussed in detail in class as they approach, and details will be posted on Canvas. They will be a mixture of open book and closed book, and equation sheets are allowed, with some limitations.

**Extra Credit**

There are 12 LearnSmart assignments on the Connect website. These are theory-based questions and are not required, but they are highly recommended to help you learn the material. They also serve as a great tool for studying before exams! You can receive extra credit in this class by completing these assignments by their respective due dates.

- 6 LearnSmart assignments completed, score of 70% or better: 1 point added to class grade.
- 12 LearnSmart assignments completed, score of 70% or better: 2 points added to class grade.
- 12 LearnSmart assignments completed, score of 100%: 3 points added to class grade.

**Classroom Protocol**

Please place your cellphones on silent and refrain from using them during class. If you absolutely must take an emergency phone call, please leave the room quietly to do so. Exams and quizzes will be given at the beginning of class, so please be punctual.

**University Policies**

**General Expectations, Rights and Responsibilities of the Student**

As members of the academic community, students accept both the rights and responsibilities incumbent upon all members of the institution. Students are encouraged to familiarize themselves with SJSU’s policies and
practices pertaining to the procedures to follow if and when questions or concerns about a class arise. See University Policy S90–5 at http://www.sjsu.edu/senate/docs/S90-5.pdf. More detailed information on a variety of related topics is available in the SJSU catalog, at http://info.sjsu.edu/web-dbgen/narr/catalog/rec-12234.12506.html. In general, it is recommended that students begin by seeking clarification or discussing concerns with their instructor. If such conversation is not possible, or if it does not serve to address the issue, it is recommended that the student contact the Department Chair as a next step.

**Dropping and Adding**

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester’s Catalog Policies at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic calendar located at http://www.sjsu.edu/academic_programs/calendars/academic_calendar/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/. Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

**Consent for Recording of Class and Public Sharing of Instructor Material**

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor’s permission to record the course. Please keep the following in mind:

- “Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor’s permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material.”

- “Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent.”

**Academic Integrity**

Your commitment, as a student, to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person’s ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU’s Academic Policy S07-2 requires approval of instructors.

It is very tempting to copy solution methods from friends when you are having trouble, or worse, use the solutions manual. This may improve your homework grade, but it will result in poor or even failing exam
grades. The best way to handle homework is to struggle through it in your own first. Use your book and notes to help you. If you're still stuck, post a discussion on Canvas to see if other students can help you. You are also encouraged to come to office hours or make an appointment with me to discuss your confusion. You are welcome to compare homework answers or solution methods with your friends after you have completed your problems, but the work you submit to me should be your own.

**Campus Policy in Compliance with the Americans with Disabilities Act**

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please contact me outside of class (email or office hours). [Presidential Directive 97-03](http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf) requires that students with disabilities requesting accommodations must register with the [Accessible Education Center (AEC)](http://www.sjsu.edu/aec) to establish a record of their disability.

**Accommodation to Students' Religious Holidays**

San José State University shall provide accommodation on any graded class work or activities for students wishing to observe religious holidays when such observances require students to be absent from class. It is the responsibility of the student to inform the instructor, in writing, about such holidays before the add deadline at the start of each semester. If such holidays occur before the add deadline, the student must notify the instructor, in writing, at least three days before the date that he/she will be absent. It is the responsibility of the instructor to make every reasonable effort to honor the student request without penalty, and of the student to make up the work missed. See University Policy S14-7 at [http://www.sjsu.edu/senate/docs/S14-7.pdf](http://www.sjsu.edu/senate/docs/S14-7.pdf).

**Student Resources**

**Student Technology Resources**

Computer labs for student use are available in the Academic Success Center at [http://www.sjsu.edu/at/asc/](http://www.sjsu.edu/at/asc/) located on the 1st floor of Clark Hall and in the Associated Students Lab on the 2nd floor of the Student Union. Additional computer labs may be available in your department/college. Computers are also available in the Martin Luther King Library. A wide variety of audio-visual equipment is available for student checkout from Media Services located in IRC 112. These items include DV and HD digital camcorders; digital still cameras; video, slide and overhead projectors; DVD, CD, and audiotape players; sound systems, wireless microphones, projection screens and monitors.

**Tutoring**

Additional tutoring may be available through the engineering honor societies. An announcement will be made in class when this becomes available.

**SJSU Peer Connections**

Peer Connections, a campus-wide resource for mentoring and tutoring, strives to inspire students to develop their potential as independent learners while they learn to successfully navigate through their university experience. You are encouraged to take advantage of their services which include course-content based tutoring, enhanced study and time management skills, more effective critical thinking strategies, decision making and problem-solving abilities, and campus resource referrals.

In addition to offering small group, individual, and drop-in tutoring for a number of undergraduate courses, consultation with mentors is available on a drop-in or by appointment basis. Workshops are offered on a wide variety of topics including preparing for the Writing Skills Test (WST), improving your learning and memory,
alleviating procrastination, surviving your first semester at SJSU, and other related topics. A computer lab and study space are also available for student use in Room 600 of Student Services Center (SSC).

Peer Connections is located in three locations: SSC, Room 600 (10th Street Garage on the corner of 10th and San Fernando Street), at the 1st floor entrance of Clark Hall, and in the Living Learning Center (LLC) in Campus Village Housing Building B. Visit Peer Connections website at http://peerconnections.sjsu.edu for more information.

**SJSU Counseling Services**

The SJSU Counseling Services is located on the corner of 7th Street and San Fernando Street, in Room 201, Administration Building. Professional psychologists, social workers, and counselors are available to provide consultations on issues of student mental health, campus climate or psychological and academic issues on an individual, couple, or group basis. To schedule an appointment or learn more information, visit Counseling Services website at http://www.sjsu.edu/counseling.
# Tentative Schedule, ME 113: Thermodynamics – Section 2, Fall 2015

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>HW Due?</th>
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</thead>
<tbody>
<tr>
<td>Aug-24</td>
<td>Basic Concepts, Pressure</td>
<td>Chapter 1</td>
<td></td>
</tr>
<tr>
<td>Aug-26</td>
<td>Forms of Energy, 1&lt;sup&gt;st&lt;/sup&gt; Law of Thermodynamics</td>
<td>2.1-2.7</td>
<td></td>
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<tr>
<td>Aug-31</td>
<td>Ozone Depletion, The Greenhouse Effect, Phase Changes, Property Diagrams</td>
<td>2.8, 11.6, 3.1-3.4</td>
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<tr>
<td>Sep-2</td>
<td>Property Tables, Equations of State</td>
<td>3.5-3.8</td>
<td>✓*</td>
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<tr>
<td>Sep-7</td>
<td>NO CLASS – Labor Day</td>
<td></td>
<td></td>
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<tr>
<td>Sep-9</td>
<td>Boundary Work, Closed Systems, Specific Heat</td>
<td>4.1-4.3</td>
<td>✓*</td>
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<tr>
<td>Sep-14</td>
<td>Gateway Quiz 1: Property Tables, Conservation of Mass, Flow Work</td>
<td>4.4</td>
<td></td>
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<tr>
<td>Sep-16</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; Law for Steady Flow, Steady Flow Processes and Devices</td>
<td>5.1-5.4</td>
<td>✓*</td>
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<tr>
<td>Sep-21</td>
<td>Problem Solving: Closed Systems and Steady Flow**</td>
<td>5***</td>
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<tr>
<td>Sep-23</td>
<td>Gateway Quiz 2: Steady Flow Processes and Devices, Introduction to Engineering Equation Solver</td>
<td>✓*, ✓**</td>
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<tr>
<td>Sep-28</td>
<td>Unsteady Flow Processes</td>
<td>5.5</td>
<td></td>
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<tr>
<td>Sep-30</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Law of Thermodynamics, Entropy</td>
<td>Ch. 6, 7.1-7.3, 7.6</td>
<td>✓*</td>
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<tr>
<td>Oct-5</td>
<td>Isentropic Processes, Property Diagrams, T-dS Relation</td>
<td>7.4, 7.5, 7.7</td>
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<td>Oct-7</td>
<td>Exam 1: Chapters 1-5</td>
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<tr>
<td>Oct-14</td>
<td>Isentropic Efficiencies cont., Entropy Balance</td>
<td>7.13</td>
<td>✓*</td>
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<td>Oct-19</td>
<td>Quiz 3: Entropy, Problem Solving: Chapter 7**</td>
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<td>Oct-26</td>
<td>Diesel Cycle, Brayton Cycle</td>
<td>9.6, 9.8-9.9</td>
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<tr>
<td>Oct-28</td>
<td>Problem Solving: Cycles**</td>
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<tr>
<td>Nov-2</td>
<td>Carnot Vapor and Rankine Cycles, Improving Efficiencies</td>
<td>10.1-10.4</td>
<td>✓**</td>
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<td>Nov-4</td>
<td>Exam 2: Chapters 6, 7, 9</td>
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<td>Nov-9</td>
<td>Reheat and Regenerative Cycles, Cogeneration</td>
<td>10.5-10.6, 10.8</td>
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<td>Nov-11</td>
<td>NO CLASS – Veterans Day</td>
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<td>✓*</td>
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<tr>
<td>Nov-16</td>
<td>Vapor-Compression Cycle, Mole and Mass Fraction</td>
<td>11.1-4, 11.7, 13.1</td>
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<tr>
<td>Nov-18</td>
<td>Properties of Gas Mixtures</td>
<td>13.2-13.3</td>
<td>✓*</td>
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<td>Nov-23</td>
<td>Quiz 4 Rankine Cycle, Problem Solving: Mixtures**</td>
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<tr>
<td>Nov-25</td>
<td>Humidity, Psychrometric Chart</td>
<td>14.1-14.5</td>
<td>✓*, ✓**</td>
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<tr>
<td>Nov-30</td>
<td>Air Conditioning Processes</td>
<td>14.6-14.7</td>
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<tr>
<td>Dec-2</td>
<td>Problem Solving: Air Conditioning Processes</td>
<td></td>
<td>✓*</td>
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<tr>
<td>Dec-7</td>
<td>Review</td>
<td></td>
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<tr>
<td></td>
<td>Final Exam: Wednesday, December 16, 7:15-9:30 AM</td>
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*All normal homework assignments are due on Wednesdays at 5:00 PM via the Connect website.
**Some in-class assignments (marked) are due at the beginning of the following class period, although you may hand them in the same day if you are done. If you are unable to attend class, the problems will be posted on Canvas before the class period in which they are assigned, and you are responsible for completing them and handing them in by the due date.
***The Gateway Essay is due September 22nd via Canvas.