CHEM 1411 — General Chemistry I Syllabus — Fall, 2018

Faculty Information
Dr. David Carter  
Office: CAV 218  
Phone: 325 486-6626  
E-mail: david.carter@angelo.edu  
Office Hours: M 1:30-3:00 PM; W 8:00-9:30 AM, R 9:30-11:30 AM or by appointment

CHEM 1411 Sections

<table>
<thead>
<tr>
<th>Sec</th>
<th>Days</th>
<th>Time</th>
<th>Instructor</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture 060</td>
<td>TR</td>
<td>8:00 AM - 9:15 AM</td>
<td>Dr. Carter</td>
<td>CAV 200</td>
</tr>
<tr>
<td>Lab 11Z</td>
<td>T</td>
<td>11:00 AM - 1:50 PM</td>
<td>Dr. Carter</td>
<td>CAV 211/212</td>
</tr>
<tr>
<td>16Z</td>
<td>W</td>
<td>2:00 PM - 4:50 PM</td>
<td>Dr. Carter</td>
<td>CAV 215/216</td>
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Required Supplies
- **Textbook and SmartWork online homework [Both Required]:**  
- **Lab Manual [Required]:** Zumdahl, Zumdahl, Osborne *Angelo State University Chemistry 1411*, (ASU Custom Lab Manual, 2017)
- **Approved Lab Goggles [Required]** (available from the ASU Bookstore or from the lab stockroom)
- **Calculator [Required]:** Scientific calculator capable of performing calculations with scientific notation and logarithms. **Bring your calculator to class and to lab every day. Only non-programmable calculators may be used on the exams.**
- **Lab Notebook**
- **TopHat “clicker” registration** and appropriate phone, tablet or laptop.

Course Description
In this class, you will study the fundamental laws and theories of chemistry, chemical nomenclature, chemical equilibrium, metals and non-metals and their compounds, nuclear chemistry and the quantum theory of structure. Prerequisites: Chemistry 1411 is to be completed before Chemistry 1412. Proficiency in algebra required. Only students eligible to take college-level mathematics courses may take Chemistry 1411.

Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
<th>Point Breakdown</th>
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<tbody>
<tr>
<td>3 Exams, (100 pts each)</td>
<td>300 pts</td>
<td><strong>A</strong> = 90-100%</td>
</tr>
<tr>
<td>Final</td>
<td>150 pts</td>
<td><strong>B</strong> = 80-89.9%</td>
</tr>
<tr>
<td>Quizzes, classroom participation</td>
<td>150 pts</td>
<td><strong>C</strong> = 70-79.9%</td>
</tr>
<tr>
<td>Online Homework</td>
<td>200 pts</td>
<td><strong>D</strong> = 60-69.9%</td>
</tr>
<tr>
<td>Laboratory</td>
<td>200 pts</td>
<td><strong>F</strong> = &lt;60%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1000 pts</td>
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Exams
*** Exam schedule is located in the Proposed Course Schedule provided with the syllabus. ***

Most of the exams will be over material covered since the last exam. However, the course builds on material delivered earlier so the concepts, calculations and techniques from earlier exams may be required. **Only non-programmable calculators may be used on the exams (i.e., no graphic calculators are allowed).**

Make up exams will be at the discretion of your instructor. Usually, allowances will only be made in the case of an **excused university absence.** You must contact your instructor and get approval before the exam if you plan to have an excused absence. Contact your instructor within 24-hours of the exam for absences that are due to unavoidable, last-minute situations.

Final Exam
The Final Exam will be a comprehensive multiple-choice standardized exam published by the American Chemical Society (ACS). Study guides for the ACS exam (“General Chemistry - Official Study Guide”) are available for sale in the lab stockroom and from the [ACS Study Guide Page](http://chemexams.chem.iastate.edu/).

*** The schedule for the 1411 final exams is shown in the Proposed Course Schedule. ***

The [ASU Final Exam Schedule](http://www.angelo.edu/services/registrars_office/final.html) is also available on the web².

Online Homework
Assignments will be given using Smartwork.

Blackboard
Grades, information, handouts, homework assignments, and other course documents will be posted on [Blackboard](http://blackboard.angelo.edu).

*** Check Blackboard and the Online Homework Sites Daily. ***

Attendance
You are expected to attend all class meetings. You are expected to arrive on time and to stay until the end of the lecture. In-classroom activities such as worksheets and quizzes cannot be made up. You will **not** be automatically dropped if you stop attending class. Attendance will be taken using TopHat Classroom Response System. If unexcused absences exceed the limits set below, you will automatically receive a grade of F for the course.

- Fall/Spring, MWF classes: F will result if you have more than 12 unexcused absences.
- Fall/Spring, TR classes: F will result if you have more than 8 unexcused absences.
- Summer, classes: F will result if you have more than 6 unexcused absences.

A student who intends to observe a religious holy day should make that intention known in writing to the instructor prior to the absence.

TopHat Classroom Response System, Attendance, Class Participation
We will be using the Top Hat ([www.tophat.com](http://www.tophat.com)) classroom response system in class. You will be able to submit answers to in-class questions using Apple or Android smartphones and tablets, laptops, or through text message.

**You should create account (if you do not already have one), purchase access for the semester/term (if you have it for another course, it will work for this course as well).**

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1 [http://chemexams.chem.iastate.edu/](http://chemexams.chem.iastate.edu/)
2 [http://www.angelo.edu/services/registrars_office/final.html](http://www.angelo.edu/services/registrars_office/final.html)
3 [http://blackboard.angelo.edu](http://blackboard.angelo.edu)
*** TopHat Registration information is available in Blackboard ***

Top Hat will require a paid subscription. For a full breakdown of all subscription options available please visit www.tophat.com/pricing.

All technical problems in responding to questions or recording your presence should be directed to TopHat support the same day that it occurs.

Class Participation with TopHat:
some questions requiring students to respond using TopHat will be asked for the purpose of determining the extent of student understanding. Students will receive credit for responding to these questions regardless of their answer.

TopHat Quiz Questions:
some TopHat questions will be asked as quiz questions and students will only get full credit if they respond with the correct answer.

Other Quizzes
quizzes will also be given on paper counting toward the class participation/quiz grade.

Last Day to Drop is indicated in the Proposed Course Schedule

Honor Code / Academic Dishonesty
Angelo State University expects its students to maintain complete honesty and integrity in their academic pursuits. Students are responsible for understanding the Academic Honor Code, which is to be found in the Student Handbook. The penalty for ANY sort of dishonesty, cheating or plagiarism can range from a grade of zero on the assignment to a F in the course and disciplinary action as warranted in accordance with university guidelines. Don’t even consider it.

Disabilities
Persons with disabilities which may warrant academic accommodations must contact the Student Life Office, Room 112 University Center, in order to request and to implement academic accommodations.

CHEM 1411 LAB CLASSES

Lab Course
The CHEM 1411 General Chemistry laboratory class accompanies this lecture class. The lab is designed to illustrate some of the principles involved in performing scientific measurements, handling chemicals, and performing chemistry experiments. In some cases, the experiments in the lab will introduce you to concepts before you cover them in the lecture course, and in some cases, the experiments will reinforce concepts already covered in the lecture course.

Labs will begin meeting on the first scheduled day of lab. Bring your calculator!

Laboratory Attire
Beginning on the first day of lab, everyone MUST have approved goggles, long-sleeved shirts which cover the midriff, long pants, and shoes with closed toes and heels (no sandals, slides, etc.). (Basically, you should have as little exposed skin as possible.) Anyone not wearing the appropriate attire will not be allowed into lab.

4 www.angelo.edu/cstudent/
Lab Manual and Lab Reports
The lab manual provides
- description of the background for each experiment
- pre-laboratory questions that will be turned in at the beginning of the lab period
- procedure for the experiment
- lab report form
- Post-lab questions or problems

Your lab instructor will give you specific directions on how these items and lab notebook entries should be submitted for grading.

**You should show ALL of the calculations made in doing the lab and competing the report.**
It is essential that you read the upcoming experiment before coming to lab.

Cleaning Up After Lab
Make sure that your lab area is clean and that all glassware and hardware has been cleaned and returned to the appropriate drawers before leaving the lab.

Lab Safety Training – Must be completed by 11:59 PM, Sunday, September 9
All students enrolled in lab courses are required to take a Mandatory Laboratory Safety Training and Quiz on Blackboard. Instructions for completing the quiz are provided in Blackboard > Laboratory. Login to Blackboard, and choose the course: entitled “Lab Safety Training.”
1. Under the left hand menu, choose: “Get Started Here”.
2. There are three sections:
   a. Welcome to Lab Safety Training — There are your instructions.
   b. Lab safety training — Click on “Lab Safety - Click here to begin”. This will download a PowerPoint slide show which will cover the safety training.
   c. The lab safety quiz. You must score 90% or higher. You can take it again in 24 hours.

Lab Grading and Make-Up Policy
Labs will be worth 100 “lab points” each. The lowest lab score will be dropped from the total. If you miss a lab for a valid reason, that is the score that will be dropped.
There will be a 100-point lab Midterm Lab Exam, given during the week of October 29, and a 100-point Lab Final Exam given during the last week of classes. These grades will not be dropped from the total.
The lab reports for the experiments, the lab assignments and the lab exams will be averaged, and reported to your lecture instructor as a 200 “lecture point” grade.

Students need to provide the instructor with written explanations of all excused absences. In the event that a student has multiple excused absences that could not be made up, the situation should be discussed with your instructor as soon as possible. All excused absences have to be documented before (planned absence) or immediately following emergency absences.
Student Learning Outcomes

- **Learning Goal 1:** Students will be able to analyze complex chemical problems and draw logical conclusions.
  - Students will be able to use an understanding of atomic structure at the basic and atomic levels to analyze the structure and reactivity of substances and chemical species.
  - Students will be able to use an understanding of how energy interacts with matter to predict stable chemical species, and perform thermodynamic calculations describing chemical reactions.

- **Learning Goal 2a:** Students will be able to understand and apply scientific reasoning in the chemical sciences.
  - Students will be able to use an understanding of ions and molecules at the atomic level to predict the behavior of reactions in aqueous solutions.
  - Students will be able to use the basic ideas of quantum mechanics to describe how molecular bonds form and to predict molecular shape and polarity. Molecular structure and polarity will be used to predict the forces between molecules and relate those forces to the states of matter and phase changes.

- **Learning Goal 2b:** Students will be able to employ mathematics in the analysis of chemical problems.
  - The mole concept, chemical formulas and balanced chemical equations will be used to do chemical calculations that relate macroscopic measurements to numbers of atoms, ions or molecules.
  - Students will be able to do calculations involving solution concentration and know how to prepare solutions of given concentrations.
  - Students will be able to quantitatively predict gas properties using gas law calculations.

- **Learning Goal 3:** Students will be able to demonstrate technical and analytical skills in chemistry.
  - Students will be able to use the periodic table to determine basic atomic information and to predict trends in atomic properties.
  - Students will be able to interconvert between chemical names and formulas to the extent that they can work problems given only one of those pieces of information.
  - Students will be able to classify common types of chemical reactions and predict the outcomes of reactions.

**Evaluation of Student Learning Outcomes**

Student learning outcomes will be evaluated by test questions or by the grading of in-classroom activities, as described by your instructor.

**Texas Higher Education Coordinating Board Natural Sciences Objectives**

The objective of the study of a natural sciences component of a core curriculum is to enable the student to understand, construct, and evaluate relationships in the natural sciences, and to enable the student to understand the basis for building and testing theories.

**Exemplary Educational Objectives**

1. To understand and apply method and appropriate technology to the study of natural sciences.
2. To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretation both orally and in writing.
3. To identify and recognize the differences among competing scientific theories.
4. To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.
5. To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.
# Proposed Course Schedule

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>Thursday Sept. 29, 5:30 PM-7:30 PM, MCS 100</td>
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<tr>
<td>Exam 2</td>
<td>Thursday, Oct. 25, 5:30 PM-7:30 PM, MCS 100</td>
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<tr>
<td>Exam 3</td>
<td>Thursday, Nov. 29, 5:30 PM-7:30 PM, MCS 100</td>
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<tr>
<td>FINAL</td>
<td>Tuesday, December 11, 8:00-10:00 AM, MCS 100</td>
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The last day to drop the course with a grade of “W” is **Monday, April 2, 2018.**

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<tr>
<th>Wk #</th>
<th>Lecture Topics</th>
<th>Lab</th>
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| 1    | **Sections Covered:** 1.1-1.5, 2.5-2.7 | **Lab 8/27-8/30** (Section 1.8&1.10)  
Introduction and Safety  
Metric System, Precision, Accuracy, Sig Figs  
*Measuring Mass and Volume, Spring 2018*  
Available in Blackboard. |
|      | **Tues 8/28:**  
- Salt and Water  
- Molecular level diagrams  
- Nomenclature Assignment 1  
  (Sec. 2.6-2.7a) | |
|      | **Thurs 8/30:**  
- Interactive exercise: Compounds of Six Elements  
- Nomenclature Assignment 1  
  (Sec. 2.6-2.7a) | |
| 2    | **Sections Covered:** Sec, 1.1-1.3, 1.6, 2.5-2.7 | **Monday Holiday - NO Lab This Week**  
Assignments (due on or before next lab – set by lab instructor):  
- Required University Lab Safety Course  
- “Scientific Measurement & Presentation of Data” |
|      | **Tues 9/4:**  
- Two ways to classify matter - macroscopic and microscopic  
- Nomenclature Assignment 1  
  (Sec. 2.5-2.7) | |
|      | **Thurs 9/6:**  
- Quiz on Nomenclature Assignment 1  
- Nuclear atom (Sec. 2.5)  
- Nomenclature Assignment 2  
  (Sec. 2.6-2.7) | |
| 3    | **Sections Covered:** 2.1-2.4, 3.1-3.2 | **Lab 9/10-9/13** (Section 1.9 covered)  
Experiment 3: The Use of Volumetric Glassware |
|      | **Tues 9/11:**  
- Hx development of nuclear atom  
  Sec. 2.1-2.3 & Openstax 2.1-2.3  
- Relate isotopic mass and abundance to atomic weight (Sec. 2.4)  
- Atomic weight & Avogadro’s Number (g, mole and number of atoms) | |
|      | **Thurs 9/13:**  
- Quiz on Nomenclature Assignments 1&2  
- Molar Mass (Sec. 3.2)  
- Memorize 7 Common Oxoacids | |
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<tr>
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<th>Lab</th>
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</table>
| 4    | **Sections Covered: 3.1-3.9**  
**Tues 9/18:**  
- Quiz on 7 Common Oxoacids  
- Nomenclature Assignment 3 (Sec. 2.7)  
- Introduction to Stoichiometry (Sec. 3.2)  
- Mass Stoichiometry (ratios from formulas)  
- Empirical Formulas (Sec. 3.6-3.7)  
**Thurs 9/20:**  
- Chemical Equations (Sec. 3.3-3.4)  
- Reaction Stoichiometry (mass based, Sec. 3.5, 3.9)  
- Combustion Analysis (if time allows, Sec. 3.8)  
| Lab 9/17-9/20  
Experiment 4: Density Determinations |
| 5    | **Sections Covered: 4.1-4.7**  
**Tues 9/25:**  
- Quiz on Nomenclature Assignments 1-3  
- Nomenclature Assignment 4&5 (Sec. 2.6)  
- Solutions and concentration (Sec. 4.2)  
- Dilutions (Sec. 4.3)  
- Solution Stoichiometry (Sec. 4.6)  
**Thurs 9/27**  
- Electrolytes and nonelectrolytes (Sec. 4.4)  
- Classify reactions: number of reactants & products/exchange  
- Precipitation reactions (Sec. 4.7)  
**Thurs 9/27 Exam 1 Chap 1-3 5:30-7:30 PM in MCS 100**  
| Lab 9/24-9/27  
Experiment 11: Percentage Water in a Hydrate |
| 6    | **Sections Covered: 4.5, 4.7-4.9**  
**Tues 10/2:**  
- Quiz on Nomenclature Assignments 1-4  
- Ion exchange, ionic and net-ionic equations  
- Acid-base reactions (Sec. 4.5)  
**Thurs 10/4:**  
- Redox reactions (Sec. 4.9)  
- Catch Up  
| Lab 10/1-10/4  
Percentage of Potassium Chlorate in a Mixture  
Available in Blackboard |
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<tr>
<th>Wk #</th>
<th>Lecture Topics</th>
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</table>
| 7    | **Sections Covered:** Sec. 5.1-5.3a, 5.4, 5.8  
**Tues 10/9:**  
- State Functions  
- Heat at constant pressure (ΔH)  
- Endothermic, exothermic, thermochemical equations  
**Thurs 10/11:**  
- Standard enthalpies of formation  | **Lab 10/8-10/11 (Cover Sections 6.1 & 6.3)**  
Experiment 12: Titration of Vinegar  
Section 4.6 (Titrations) |
| 8    | **Sections Covered:** 5.3b-5.7, 6.1, 6.2, 6.4  
**Tues 10/16:**  
- Hess’s Law  
- Internal energy, definition of enthalpy  
- Enthalpy of combustion (if time allows)  
**Thurs 10/18:**  
- Gas properties and pressure  
- Ideal Gas Law (possibly start type I problems)  | **Lab 10/15-10/18**  
Covered in this lab:  
- Section 5.1, 5.3a, 5.5  
Experiment 5: Specific Heat Capacity  
*** Last lab that will be covered on Mid-term Lab “Quiz” *** |
| 9    | **Sections Covered:** 6.3-6.7  
**Tues 10/23:**  
- Type I Ideal Gas Law Problems (Sec. 6.4)  
- Gases in chemical reactions (Sec. 6.5)  
- Type II Ideal Gas Law Problems (Sec.6.3)  
**Thurs 10/25:**  
- Named gas laws (Sec. 6.3)  
- Advanced Ideal Gas Law concepts (Sec. 6.6-6.7)  
**Thurs 10/25  
Exam 2 Chaps 4-6  
5:30-7:30 PM in MCS 100**  | **Lab 10/22-10/25**  
Experiment 7: Heats of Reaction: Hess’s Law |
| 10   | **Sections Covered:** 6.8-6.9, 7.1-7.2  
**Tues 10/30:**  
- Kinetic molecular theory of gases (Sec. 6.8)  
- Real vs ideal gases (Sec. 6.9)  
*** Thursday, Nov. 1 - Last Day to Drop ***  
**Thurs 11/1:**  
- Electromagnetic radiation (Sec. 7.1)  
- Wave behavior of light (Sec. 7.2)  | **Lab 10/29-11/1**  
Midterm Lab “Quiz” (covering labs before 10/19)  
Experiment 10: Preparation and Properties of Hydrogen and Oxygen Gases (Demo – Data sheets to be completed) |
<table>
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<tr>
<th>Wk #</th>
<th>Lecture Topics</th>
<th>Lab</th>
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<tbody>
<tr>
<td>11</td>
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</table>
|      | **Sections Covered: 7.1-7.7**  
|      | **Tues 11/6:**  
|      | - Particle nature of light (Sec. 7.3)  
|      | - Atomic line spectra (Sec. 7.1, 7.4)  
|      | **Thurs 11/8:**  
|      | - Quantum nature of atom (Sec. 7.4-7.6)  
|      | - Atomic orbitals (Sec. 7.6-7.7)  
|      | Lab 11/5-11/8  
|      | Gas Laws Lab  
|      | Available in Blackboard |
| 12   | **Sections Covered: 7.8-7.12, 8.3**  
|      | **Tues 11/13:**  
|      | - Electron configurations (Sec. 7.8)  
|      | - Periodic properties (Sec. Sec. 7.9-7-12, 8.3)  
|      | **Thurs 11/15:**  
|      | - Periodic properties (continued)  
|      | Lab 11/12-11/15  
|      | Experiment 2: The Emission Spectra of Atoms |
| 13   | **Sections Covered: 8.1-8.3, 8.5, 9.2-9.3**  
|      | **Tues 11/20:**  
|      | - Lewis, VSEPR, Polarity I (Sec. 8.1-8.3, 8.5, 9.2-9.3)  
|      | **Thurs 11/22:** No Class – Thanksgiving Holiday  
|      | No Lab This Week – Give Thanks instead! |
| 14   | **Sections Covered: Sec. 8.1-8.7, 9.2-9.3**  
|      | **Tues 11/27:**  
|      | - Lewis, VSEPR, Polarity II (add Sec. 8.4)  
|      | - Lewis, VSEPR, Polarity III (add Sec. 8.6)  
|      | **Thurs 11/29**  
|      | - Bond Properties (Sec. 8.7)  
|      | - Bond Energy and chemical reactions (est. ΔE, Sec. 8.7)  
|      | **Thurs 11/29 Exam 3  5:30-7:30 PM in MCS 100**  
|      | Lab 11/26-11/29  
|      | Lewis Structure, VSEPR, Polarity  
|      | Modified Procedure will be provided on Blackboard and in class.  
|      | Complete Experiment 6 Prelab (pp. 57-58) before coming to lab. |
| 15   | **Sections Covered: 9.3, 9.4, 11.1-11.3**  
|      | **Tues 12/4**  
|      | - Intro to Molecular Orbital (MO) & Valence Bond (VB) Theory  
|      | - Advanced VB  
|      | - MO homonuclear diatomics  
|      | **Thurs 12/6**  
|      | - Introduction to Intermolecular Interactions (Sec. 10.1-10.3)  
|      | - Lattice Energy (Sec. 11.1 cover Born-Haber, etc. as time allows)  
|      | Lab 12/3-12/6  
|      | Lab Final |

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<tr>
<th>Wk #</th>
<th>Lecture Topics</th>
<th>Lab</th>
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<tbody>
<tr>
<td></td>
<td><strong>Self Study: Sections 12.1-12.3</strong></td>
<td><strong>These materials will be available in Blackboard until Jan 13, 2019.</strong></td>
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<tr>
<td></td>
<td>• Review States</td>
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<td></td>
<td>• Heating curves</td>
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<td>• Intermolecular interactions</td>
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<td></td>
<td>• Phase diagrams</td>
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<td></td>
<td><strong>Tues Dec. 11</strong></td>
<td><strong>Final Exam Sec 060</strong></td>
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<td><strong>Final Exam Sec 030</strong></td>
<td><strong>Tuesday, 8:00-10:00 AM in MCS 100</strong></td>
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