FACULTY INFORMATION

- **Dr. Kyle Beran**
  Office: CAV 102B
  Phone: 486-6663
  E-mail: Kyle.Beran@angelo.edu
  Office Hours: MWF 2-3, TR 11-12, or by appointment

- **Dr. Edith Osborne**
  Office: CAV 204A
  Phone: 486-6629
  E-mail: Edith.Osborne@angelo.edu
  Office Hours: MWRF 11:00-12:00, F 9:00-10:00

- **Dr. Gregory Smith**
  Office: CAV 207A
  Phone: 486-6628
  E-mail: Gregory.Smith@angelo.edu
  Office Hours: MTWF 11:00-12:00

- **Dr. Steven King**
  Office: CAV 214B
  Phone: 486-6625
  E-mail: steven.king@angelo.edu
  Office Hours: MWF 8:00-9:00, TR 8:30-9:30

- **Dr. Ralph Zehnder**
  Office: CAV 204B
  Phone: 486-6662
  E-mail: Ralph.Zehnder@angelo.edu
  Office Hours: M 12:00 -1:00, T 11:00 -1:00, W 12:00 -1:00, F 12:00 -1:00, or by appointment; Review sessions W 5 pm

CHEM 1412 LECTURE CLASSES

Lecture Class Schedule

<table>
<thead>
<tr>
<th>Sec</th>
<th>Days</th>
<th>Time</th>
<th>Instructor</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>MWF</td>
<td>09:00 am-09:50 am</td>
<td>Dr. Beran</td>
<td>CAV 200</td>
</tr>
<tr>
<td>020</td>
<td>MWF</td>
<td>10:00 am-10:50 am</td>
<td>Dr. Beran</td>
<td>CAV 211</td>
</tr>
<tr>
<td>030</td>
<td>TR</td>
<td>09:30 am-10:45 am</td>
<td>Dr. Osborne</td>
<td>CAV 215</td>
</tr>
<tr>
<td>040</td>
<td>TR</td>
<td>09:30 am-10:45 am</td>
<td>Dr. Zehnder</td>
<td>CAV 200</td>
</tr>
</tbody>
</table>
Required Supplies

• **Textbook and SmartWork online homework [Both Required]:**
  Thomas R. Gilbert, Rein V. Kirss, Natalie Foster, Stacey Lowery Bretz, Geoffrey Davies, 

  **Purchasing Options:**
  1. Textbook (printed) + eBook + SmartWork
  2. eBook + SmartWork
  3. SmartWork only (only if you get a textbook from another source that does not include 
     SmartWork.)

  Options 1 and 2 are available from the ASU Bookstore or directly from the publisher at the 
  [Norton website](https://www.norton.com).

  Option 3 is only available from the publisher.

• **Carbon Copy Lab Notebook** (available from the ASU Bookstore or from the lab stockroom)

• **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. Only non-programmable calculators may be used on 
  the exams.
  *Bring your calculator to class and to lab every day.*

• **TopHat student and classroom engagement platform [Required]**
  We will be using TopHat, which is an interactive system that will allow students to use their 
  cell-phones, and/or tablets, and/or laptops to answer questions/quizzes instantly in class and 
  at home. To get started and for more information please go to this link and create an account 
  unless you have already a TopHat Account at ASU: [https://tophat.com](https://tophat.com)

  Please see the information below:

  **Course Name:** Chem 1412 - Spring 2019
  **Direct URL:** [https://app.tophat.com/e/186644](https://app.tophat.com/e/186644)
  **6-digit join code:** 186644

  **Purchasing Options:**
  1. Create account for 1 semester (4 months): $26
  2. Create account for 2 terms (12 months): $38
  3. Lifetime access: $75

  You only need to create ONE account that you will be able to use for all classes at ASU that 
  utilize TopHat.

  For an overview on how to get started with TopHat visit: [https://support.tophat.com/hc/en- 

**Course Description**
This course, which is a continuation of CHEM 1411, focuses on chemical kinetics, chemical 
  equilibrium, acid-base chemistry, and thermodynamics. Additional topics, such as environmental 
  chemistry, electrochemistry, coordination chemistry, nuclear chemistry, and/or polymers may be 
  introduced.
Prerequisites
Chemistry 1411 is to be completed with a grade of C or better before Chemistry 1412. Proficiency in algebra required. Only students eligible to take college-level mathematics courses may take Chemistry 1412.

Grading

<table>
<thead>
<tr>
<th>Category</th>
<th>Points Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (3×100 pts)</td>
<td>300 pts</td>
</tr>
<tr>
<td>Final</td>
<td>150 pts</td>
</tr>
<tr>
<td>Quizzes, classroom participation</td>
<td>150 pts</td>
</tr>
<tr>
<td>SmartWork Homework</td>
<td>200 pts</td>
</tr>
<tr>
<td>Laboratory</td>
<td>200 pts</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1000 pts</strong></td>
</tr>
</tbody>
</table>

Exams
The exams will be given outside of regular class time on the dates listed in the table below:

<table>
<thead>
<tr>
<th>Exam</th>
<th>Date</th>
<th>Room</th>
<th>Time</th>
<th>Point Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>Thursday, February 14</td>
<td>CAV TBD</td>
<td>5:30 pm</td>
<td>100 pts</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Thursday, March 21</td>
<td>CAV TBD</td>
<td>5:30 pm</td>
<td>100 pts</td>
</tr>
<tr>
<td>Exam 3</td>
<td>Thursday, April 18</td>
<td>CAV TBD</td>
<td>5:30 pm</td>
<td>100 pts</td>
</tr>
</tbody>
</table>

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 graphing calculators are allowed).

Make-up Exams
Any examination missed due to an excused absence must be made up at the end of the semester by taking a comprehensive make-up examination (The date for makeup exams will be announced during the semester).
To obtain permission to make up an examination, prior to the next class meeting you must verify with the course instructor whether or not an absence is excused according to the ASU Student handbook (www.angelo.edu/cstudent/). (This handbook also provides information concerning academic integrity and student services.)
Final Exam Schedule

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 web page. The schedule for the 1411 final exams is shown below. The complete final exam schedule is also available on the ASU web page.

<table>
<thead>
<tr>
<th>Sec</th>
<th>Days</th>
<th>Time</th>
<th>Instructor</th>
<th>Final Exam Date</th>
<th>Final Exam Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>010</td>
<td>MWF</td>
<td>09:00 am-09:50 am</td>
<td>Dr. Beran</td>
<td>Wednesday, May 8</td>
<td>8:00 am-10:00 am</td>
</tr>
<tr>
<td>020</td>
<td>MWF</td>
<td>10:00 am-10:50 am</td>
<td>Dr. Beran</td>
<td>Monday, May 6</td>
<td>10:30 am-12:30 am</td>
</tr>
<tr>
<td>030</td>
<td>TR</td>
<td>09:30 am-10:45 am</td>
<td>Dr. Osborne</td>
<td>Thursday, May 9</td>
<td>08:00 am-10:00 pm</td>
</tr>
<tr>
<td>040</td>
<td>TR</td>
<td>09:30 am-10:45 am</td>
<td>Dr. Zehnder</td>
<td>Thursday, May 9</td>
<td>08:00 am-10:00 pm</td>
</tr>
</tbody>
</table>

SmartWork Computer Homework

SmartWork is an online homework program which accompanies the Gilbert textbook. These assignments will be averaged to give a 200-point grade. To register with SmartWork from within Blackboard, follow the instructions at the end of this syllabus.

Blackboard

Grades will be posted on Blackboard. Information, handouts, homework assignments, and other course documents will either be posted on your instructor’s faculty web page, or on Blackboard.

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.

If you have the flu, please stay home. Do not help spread the flu to everyone else. Keep your professor informed as to your status by email (preferred) or telephone (if necessary). Your faculty will work with you to keep up to date in the class.

Last Day to Drop

The last day to drop the course with a grade of “W” is Thursday, March 28, 2019.

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.

E-mails

For conducting official ASU business please use your official ASU e-mail account. Please make sure that you check your ASU.EDU account on a regular basis. The instructor may send important announcements regarding this course, homework, and/or exams to your ASU e-mail.
account. You will not be able to use the excuse of not checking your e-mail with regard to assignments, tasks, or exams you missed.
Any submitted e-mails are expected to be written in a professional format and impeccable English. For more information how to communicate by e-mail please see: https://www.wikihow.com/Email-a-Professor
The instructor will refuse to read and/or respond to any messages that do not comply with such requirements.
The instructor will respond to legitimate e-mails within 24 - 48 hours during the week and may not respond until after weekends or holidays if messages are received on any of such days.

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### CHEM 1412 LAB CLASSES

The lab classes that accompany the CHEM 1412 lecture course are shown in the table below. The labs will generally meet for pre-lab lectures in the Class Room listed in the table.

<table>
<thead>
<tr>
<th>Section</th>
<th>Day</th>
<th>Meeting Time</th>
<th>Instructor</th>
<th>Class Room</th>
<th>Lab Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>05Z</td>
<td>M</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Zehnder</td>
<td>CAV 211</td>
<td>CAV 212</td>
</tr>
<tr>
<td>06Z</td>
<td>T</td>
<td>11:00 am-01:50 pm</td>
<td>Dr. Osborne</td>
<td>CAV 215</td>
<td>CAV 212</td>
</tr>
<tr>
<td>07Z</td>
<td>T</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Zehnder</td>
<td>CAV 215</td>
<td>CAV 212</td>
</tr>
<tr>
<td>08Z</td>
<td>W</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Zehnder</td>
<td>CAV 219</td>
<td>CAV 212</td>
</tr>
<tr>
<td>09Z</td>
<td>R</td>
<td>11:00 am-01:50 pm</td>
<td>Dr. Smith</td>
<td>CAV 219</td>
<td>CAV 212</td>
</tr>
<tr>
<td>10Z</td>
<td>R</td>
<td>02:00 pm-04:50 pm</td>
<td>Dr. Smith</td>
<td>CAV 211</td>
<td>CAV 212</td>
</tr>
<tr>
<td>11Z</td>
<td>W</td>
<td>11:00 am-01:50 pm</td>
<td>Dr. King</td>
<td>CAV 211</td>
<td>CAV 212</td>
</tr>
</tbody>
</table>

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**Lab Course**
The CHEM 1412 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 day of class. 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.

**Lab Experiments and Lab Reports**
All laboratory experiment handouts will be posted on Blackboard. Print off the experiment handout and bring it with you to lab. The lab handout provides a description of the background for each experiment, pre-laboratory questions that will be turned in at the beginning of the lab period, a procedure for the experiment, and a lab report form which must be handed in when the lab is completed. You will also need to record data in a lab notebook, and hand in the carbon copies from that notebook when the lab is complete. It is essential that you read the handout before coming to class. Grades for the lab reports for the experiments, the lab assignments, and the lab final will be averaged together and reported to your lecture instructor as a 200 point
grade.

You will also need to record data in a lab notebook, and hand in the carbon copies from that notebook when the lab is complete. The lab notebook should include an abstract for the experiment, a short summary of the procedure for the lab, all of the data collected during the lab and any observations that are made, and a conclusion for the lab.

The grade for each lab will come from the lab report, the pre-lab questions, and the carbon copy pages from the lab notebook. Each lab will be worth 100 points.

**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.

**Make-Up Lab Policy**
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.

**Lab Safety Training**
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 given below:

1. Login to Blackboard, and choose the course: entitled “Lab Safety Training.”
2. Under the left hand menu, choose: “Get Started Here”.
3. 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.

The Lab Safety Training must be completed by the evening of Sunday, January 13, 2019. If you have taken the lab safety training during a previous semester you do not have to take the safety training again.

**Lab Quizzes and Final**
There will be one 50-point lab mid-term, one 50-point lab practical, and a 100-point lab final. These grades will not be dropped from the total.

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This syllabus is subject to change.
<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Lecture</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/14</td>
<td><strong>Chapter 10 Intermolecular Forces</strong>&lt;br&gt;Dipole-dipole forces, dispersion forces, polarity and solubility, vapor pressures, solubility of gases, phase diagrams.</td>
<td>Qualitative Analysis of Anions (all lab procedures are posted on Blackboard) Mandatory Lab Safety Training and Quiz — instructions given in Lab Safety Training section (must be completed by January 13) ONLY necessary if not taken before.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Chapter 11 Properties of Solutions</strong>&lt;br&gt;Interactions between ions, vapor pressures of solutions, lattice energy, Born-Haber Cycle, colligative properties.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1/21</td>
<td><strong>Monday, Jan 21 — Martin Luther King Day</strong>&lt;br&gt;Chapter 11 continued</td>
<td>Labs Do Not Meet&lt;br&gt;MLK day Monday, January 21.&lt;br&gt;Take home assignment (Significant Figures and Algebra worksheet) will be posted on Blackboard and is due at the beginning of lab during the week of January 28 (Lectures will continue Tuesday through Friday)</td>
</tr>
<tr>
<td>3</td>
<td>1/28</td>
<td><strong>Chapter 12 Solids</strong>&lt;br&gt;The solid state, structures of metals, ionic solids, salt crystals.</td>
<td>Qualitative Analysis of Group I Cations</td>
</tr>
<tr>
<td>4</td>
<td>2/04</td>
<td><strong>Chapter 13 Chemical Kinetics</strong>&lt;br&gt;Reaction rates, integrated rate laws, Arrhenius Equation, reaction mechanisms.</td>
<td>Qualitative Analysis of an Unknown Salt</td>
</tr>
<tr>
<td>5</td>
<td>2/11</td>
<td><strong>Thursday, February 14 Exam 1 (Chpt. 10, 11, 12, 13)</strong>&lt;br&gt;Chapter 13 continued</td>
<td>Spectrophotometry of FD&amp;C Red 40</td>
</tr>
<tr>
<td>6</td>
<td>2/18</td>
<td><strong>Chapter 14 Chemical Equilibrium</strong>&lt;br&gt;Dynamics of equilibria, equilibrium constants, Le Châtelier’s Principle.</td>
<td>A Kinetic Study: The Reaction of Crystal Violet with NaOH</td>
</tr>
<tr>
<td>7</td>
<td>2/25</td>
<td>Chapter 14 continued</td>
<td>A Kinetic Study Part II: Temperature Dependence and Activation Energy of the Rate of Reaction of Crystal Violet and NaOH</td>
</tr>
<tr>
<td>8</td>
<td>3/4</td>
<td><strong>Chapter 15 Acid and Base Equilibria</strong>&lt;br&gt;Strong and weak acids and bases, pH, pKb, pKa, pKw, acidic and basic salts.</td>
<td>Equilibrium and Le Châtelier’s Principle</td>
</tr>
<tr>
<td>9</td>
<td>3/11</td>
<td><strong>Spring Break — No Classes!</strong></td>
<td>Spring Break – No Classes!</td>
</tr>
<tr>
<td>Day</td>
<td>Lecture</td>
<td>Lab</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>---------</td>
<td>-----</td>
<td></td>
</tr>
</tbody>
</table>
| 10  | Chapter 15 continued  
**Thursday, March 21 Exam 2**  
(Chpt. 13, 14, 15) | Analysis of Antacid Tablets |
| 11  | Chapter 16 Additional Aqueous Equilibria  
Common ion effect, buffer solutions, solubility product constant. | Lab Midterm Exam |
| 12  | Chapter 17 Thermodynamics  
Spontaneous process, entropy, free energy, chemical equilibrium. | Analysis of Titration Curves |
| 13  | Chapter 17 continued | Lab Practical |
| 14  | Chapter 18 Electrochemistry  
Voltaic cells, standard potential, concentration cells, batteries, fuel cells, corrosion.  
**Thursday, April 18 Exam 3** (Chpt. 16, 17, 18) | Gibb’s Free Energy, Entropy, and Spontaneous Reactions |
| 15  | Chapter 18 continued | Electrochemistry: Anodizing Aluminum and Etching Brass |
| 16  | Chapter 19 Nuclear Chemistry  
Radioactive decay, nuclear fission, nuclear fusion, nuclear energy. | Lab Final |
| 17  | **Final Exams**  
(see Final Exam Schedule, final will be given in your lecture classroom) | |

As in the previous semester, you will upload your completed lab reports including the data sheets from your lab notebook as one single pdf file in BlackBoard.

In my sections, please strictly follow these guidelines:

Your lab report must be one single pdf file with ALL pages in the vertical (portrait) format. Your lab report sheets must be on top, the data sheets will be added at the bottom of the document. The file name has to be in the following format:

Firstname_Lastname_day2:00pm_labname

Please use only one brief word or abbreviation that identifies the experiment title as the labname.

Your filled out prelab materials have to be uploaded by midnight before the day of the lab. At the bottom of the document please add the scan of your purpose statement and procedure description that you prepared in your lab notebook.
The prelab file name has to be in the following format:

Firstname_Lastname_day2pm_labname_prelab

Prelabs are generally worth 25 points of the 100 p lab report and the purpose statement and procedure description will score 10 points.

Thus, in total your prelab upload will be worth 35 points. If not uploaded by midnight the day before your lab meets, you will lose the entire 35 points. This means for failing to upload your prelab materials in time you reduce the possible maximum score for that particular lab report to 65 points. Late uploads will not be graded.
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.

4. www.wwnorton.com/smartwork
5. http://blackboard.angelo.edu (or access Blackboard from RamPort)
6. www.angelo.edu/cstudent/
To enroll in the SmartWork online homework please go to “content” in BlackBoard and click on the link SmartWork5, which looks like the one shown in the picture below.

Then follow the guidelines given by Norton.