Course Syllabus  
Spring 2024  
CHEM 1312-001  
General Chemistry II

Course Description: Equilibrium, kinetics, redox, descriptive chemistry and radiochemistry.

Number of Credit Hours: 3 semester hours

Course Prerequisites and Corequisites: Prerequisites: CHE 1311, 1111L, and MTH 1314. Corequisite: CHEM 1112L if enrolled in other courses on campus.

Program Learning Outcomes: There are no specific program learning outcomes for this major addressed in this course. This course is a general education core curriculum course and a service course.

Core Objectives (CO):
1. Critical Thinking: to include creative thinking, innovation, inquiry and analysis, evaluation and synthesis of information.
2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral, and visual communication.
3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.
4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

Course Objective: To provide students with an explanation of the basic principles of chemistry and to apply these principles to problem solving involving critical thinking.

Student Learning Outcomes: Upon completion of this course, the students are expected to
- apply chemistry concepts using critical thinking skills and the scientific method to analyze and evaluate information to reach conclusions within problem sets and lab experiments.
- use communication skills to demonstrate their interpretation and analysis of scientific data.
- apply logic, quantitative reasoning, and pattern recognition to analyze and evaluate numerical data/observable facts to reach conclusions within problem sets and lab experiments.
- demonstrate the ability to cooperate within groups to gather results of an experiment, analyze data, and draw conclusions using communication skills.

This course meets educator preparation standards for one or more certification programs; a complete listing of all the educator preparation standards this course meets can be found at:  
https://sfasu.edu/docs/jacksteach/jacksteach-standards-alignment-chart.xlsx
General Chemistry II  
CHEM 1312 – 001  
Time of Meeting: MWF 10:00 am – 10:50 am  
Semester: Spring (Face-to-Face)  
January 17, 2024 - May 10, 2024

<table>
<thead>
<tr>
<th>Name</th>
<th>Chemistry and Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td><a href="mailto:onchokekk@sfasu.edu">onchokekk@sfasu.edu</a></td>
</tr>
<tr>
<td>Phone</td>
<td>936-468-2386</td>
</tr>
<tr>
<td>Office</td>
<td>Math 118</td>
</tr>
<tr>
<td>Office Hours</td>
<td>M 12 - 1; T 10-11; W 12 - 1; R 9 -10 am, 4 - 5 p.m, via Zoom, or walk in, or by appointment</td>
</tr>
<tr>
<td>Lecture times</td>
<td>MWF 10:00 am - 10:50 am, in CHEM building Rm. 106</td>
</tr>
</tbody>
</table>

**CATALOG DESCRIPTION:** General Chemistry II (CHEM 1312) – Equilibrium, kinetics, redox, and descriptive chemistry.

**Zoom Meeting Times for Faculty:**  
Kefa Onchoke is inviting you to a scheduled Zoom meeting.

Topic: CHEM 1312-001  
Join Zoom Meeting  
https://sfasu.zoom.us/j/96059344407?pwd=NGswN2pkRjZvY1pMb2pOeUNtWFFMdz09  
Meeting ID: 960 5934 4407  
Passcode: 510564  
E-mail Dr. Onchoke for any question with regard to the course.

**Office Hours:** M 12 - 1; T 10-11; W 12 - 1; R 9 -10 am, 4 – 5 p.m. By email, or walk in, and via zoom video conferencing. Zoom appointments are most convenient during these times. You can email professor to set up a Zoom meeting. An ID and password will be provided for any appointed meeting.

**Times:** There are only Face-to-Face meetings for this course. All due dates in the syllabus and D2L are based on CDT/CST (Texas) time zones. Late assignments or extensions will not be considered due to difference in time zones.  
**OnLine Support:** http://d2l.sfasu.edu

**COURSE DESCRIPTION:**  
Equilibrium, kinetics, redox, descriptive chemistry and radiochemistry.  
Prerequisite(s): CHEM 1311; MATH 1314 or MATH 1324 or MATH 1318 or MATH 2313 or MATH 2314 or MATH 2412 Co-requisite(s): CHEM 1112.

This course is for 3 credits and typically meets for 300 minutes each week for five weeks plus meets for a 2-hour final examination. Students have significant daily reading and homework assignments involving critical thinking and quantitative reasoning. Students are tested over the material via quizzes and several
exams during the semester including a comprehensive final exam. These activities average at a minimum 12 hours of work each week to prepare outside of classroom hours.

**Prerequisites:** CHEM 1311 and 1111L

**Text and Materials:**

*Note: Any chemistry textbook can be used as a resource to supplement the PowerPoint slides.*

**Suggested textbooks**

1. Burge, Julia; Chemistry, 5th edition, McGraw Hill (book only; access to ALEKS HW system is not needed)
2. OpenStax chemistry 2e (Chemistry 2e – OpenStax): [https://openstax.org/details/books/chemistry-2e](https://openstax.org/details/books/chemistry-2e). This is a free downloadable Textbook.

**Materials**

4. Scientific calculator *(non-graphing and non-programmable)*; for example, SHARP EL-501WBBK, CASIO 115, Texas Instrument 30 XIIS. No programming or graphing calculators are to be used in exams and/or quizzes.

**My Moodle website: (For online Homework):** Onchokechemistry.com

[https://onchokechemistry.com/moodle2](https://onchokechemistry.com/moodle2)

E-mail Dr. Onchoke for any question with regard to the course.

**Mental Health and Wellness Statement**

SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

**On-campus Resources:**

SFASU Counseling Services  
[www.sfasu.edu/counselingservices](http://www.sfasu.edu/counselingservices)  
3rd Floor Rusk Building  
936-468-2401

SFASU Human Services Counseling Clinic  
[www.sfasu.edu/humanservices/139.asp](http://www.sfasu.edu/humanservices/139.asp)  
Human Services Room 202  
936-468-1041

**Crisis Resources:**

Burke 24-hour crisis line 1(800) 392-8343  
Suicide Prevention Lifeline 1(800) 273-TALK (8255)  
Crisis Text Line: Text HELLO to 741-741
**COURSE OBJECTIVES:** To provide students with an understanding of the general principles of inorganic chemistry and the ability to apply these principles to problem solving.

**STUDENT LEARNING OUTCOMES:** The student is expected to master and apply the following concepts to problem solving:

- Principles of reaction rates: reaction rates and concentration, reactant concentration with time, and reaction mechanisms.
- Principles of equilibrium: the equilibrium constant expression, determination of equilibrium constants, applications of the equilibrium constant to problem solving, and the effect of changes in conditions upon an equilibrium system.
- Principles of solubility: precipitate formation, use of the solubility product constant ($K_{sp}$) to predict solubility, dissolution of precipitates, and qualitative analysis.
- Principles of thermodynamics: enthalpy and enthalpies of formation, the first law of thermodynamics, entropy and the second law of thermodynamics, the third of thermodynamics, and free energy.
- Principles of electrochemistry: voltaic and electrolytic cells, effect of concentration on cell voltage, standard cell potentials, and batteries.

**NOTE:** All Online assignments will be done via the Moodle website https://onchokechemistry.com/moodle2/

**COURSE CALENDAR:** Course Material from the text will be covered in the following order. Exam

**Review: Key points in General Chemistry I and Chapter 27 Redox Reactions**

PowerPoint: **Review**

- video: **Review HW 1** (32:02)
  significant figures (Review pgs 1-7, 22-25 (Brown))

- video: **Review HW 2** (63:39)
  HW 2 – nomenclature (Review pgs 8-27)

- video: **Review HW 3** (16:04)
  HW 3 – molar mass / molarity (Review pgs 28-32)

- video: **Review HW 4** (67:20)
  HW 4 – solubility / net ionic eq / redox (Review pgs 33-47)

**Online Homework**

Due 1/29

**30 Chemical Kinetics**

PowerPoint: **Chapter 30**

- video: **Chapter 30 HW 5** (25:07)
  HW 5 – reaction rates (Chapter 30 pgs 1-15)
<table>
<thead>
<tr>
<th>Video</th>
<th>Duration</th>
<th>HW Details</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 30 HW 6</td>
<td>20:23</td>
<td>Reaction order (Chapter 30 pgs 16-26)</td>
<td></td>
</tr>
<tr>
<td>Chapter 30 HW 7</td>
<td>20:45</td>
<td>Determining rate law (Chapter 30 pgs 27-34)</td>
<td></td>
</tr>
<tr>
<td>Chapter 30 HW 8</td>
<td>6:41</td>
<td>Rate constant k units (Chapter 30 pg 35)</td>
<td></td>
</tr>
<tr>
<td>Chapter 30 HW 9</td>
<td>24:59</td>
<td>First order integrated rate law (Chapter 30 pgs 36-45)</td>
<td></td>
</tr>
<tr>
<td>Chapter 30 HW 10</td>
<td>6:30</td>
<td>Zero and second order rate laws (Chapter 30 pgs 46-47)</td>
<td></td>
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<tr>
<td>Chapter 30 HW 11</td>
<td>15:14</td>
<td>Half-life (Chapter 30 pgs 48-52)</td>
<td></td>
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<tr>
<td>Chapter 30 HW 12</td>
<td>24:30</td>
<td>Activation energy, catalysis, intermediates (Chapter 30 pgs 53-70)</td>
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<tr>
<td>Chapter 30 HW 13</td>
<td>33:01</td>
<td>Elementary steps and mechanisms (Chapter 30 pgs 71-90)</td>
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<tr>
<td>Online Homework</td>
<td></td>
<td></td>
<td>Due 2/12</td>
</tr>
</tbody>
</table>

**EXAM I:** Wednesday, Feb. 7 from 6:00-8:00 pm - Room to be announced

31 Chemical Equilibrium

PowerPoint: Chapter 31

<table>
<thead>
<tr>
<th>Video</th>
<th>Duration</th>
<th>HW Details</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 31 HW 14</td>
<td>40:24</td>
<td>Chemical equilibrium (Chapter 31 pgs 1-20)</td>
<td>Due 2/19</td>
</tr>
<tr>
<td>Chapter 31 HW 15</td>
<td>8:52</td>
<td>Determination of K (Chapter 31 pgs 21-30)</td>
<td>Due 2/19</td>
</tr>
<tr>
<td>Chapter 31 HW 16</td>
<td>14:06</td>
<td>Manipulating K (Chapter 31 pgs 31-34)</td>
<td>Due 2/19</td>
</tr>
<tr>
<td>Chapter 31 HW 17</td>
<td>3:17</td>
<td>Determination of K (heterogeneous) (Chapter 31 pgs 35-36)</td>
<td>Due 2/19</td>
</tr>
<tr>
<td>Chapter 31 HW 18</td>
<td>12:02</td>
<td>Direction of reaction, Q (Chapter 31 pgs 37-43)</td>
<td>Due 2/19</td>
</tr>
</tbody>
</table>
video: Chapter 31 HW 19 (17:30)
HW 19 – calculation of equil partial pressures (part I) (Chapter 31 pgs 44-57) Due 2/19

video: Chapter 31 HW 20 (6:24)
HW 20 – calc of equil partial pressures (part II) (Chapter 31 pgs 58-59) Due 2/26

video: Chapter 31 HW 21 (8:03)
HW 21 – calc of equil partial pressures (part III) (Chapter 31 pg 60) Due 2/26

video: Chapter 31 HW 22 (13:55)
HW 22 – calc of equil partial pressures (part IV) (Chapter 31 pgs 61-68) Due 2/26

video: Chapter 31 HW 23 (28:20)
HW 23 – LeChateliers Principle (Chapter 31 pgs 69-81) Due 2/26

Online Homework Due 2/27

32 Acids and Bases
PowerPoint: Chapter 32

video: Chapter 32 HW 24 (39:08)
HW 24 – Bronsted-Lowry acids and bases (Chapter 32 pgs 1-21) Due 3/5

video: Chapter 32 HW 25 (39:52)
HW 25 – acid and base strengths (Chapter 32 pgs 22-35) Due 3/5

video: Chapter 32 HW 26 (36:56)
HW 26 – pH (Chapter 32 pgs 36-52) Due 3/5

video: Chapter 32 HW 27 (15:50)
HW 27 – pH of strong acids and bases (Chapter 32 pgs 53-55) Due 3/5

Online Homework Due 3/5

EXAM II: Wednesday, March 6 from 6:00 - 8:00pm

33 Acid-Base Equilibria
PowerPoint: Chapter 33

video: Chapter 33 HW 28 (17:47)
HW 28 – weak acid ionization constant, K_a (Chapter 33 pgs 1-10) Due 3/12

video: Chapter 33 HW 29 (45:41)
HW 29 – pH of weak acid (Chapter 33 pgs 11-25) Due 3/12

video: Chapter 33 HW 30 (28:22)
HW 30 – polyprotic acids (Chapter 33 pgs 26-37) Due 3/19
<table>
<thead>
<tr>
<th>Video</th>
<th>HW 31 – weak base ionization constant, $K_b$ (Chapter 33 pgs 38-40)</th>
<th>Due 3/19</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HW 32 – pH of weak base (Chapter 33 pgs 41-46)</td>
<td>Due 3/19</td>
</tr>
<tr>
<td></td>
<td>HW 33 – acid and base properties of salt solutions (Chapter 33 pgs 47-59)</td>
<td>Due 3/23</td>
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<tr>
<td></td>
<td>HW 34 – relationship between $K_a$ and $K_b$ (Chapter 33 pgs 60-62)</td>
<td>Due 3/23</td>
</tr>
<tr>
<td></td>
<td>HW 35 – pH of salt solutions (Chapter 33 pgs 63-67)</td>
<td>Due 3/23</td>
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<td></td>
<td>HW 36 – buffers (Chapter 33 pgs 68-76)</td>
<td>Due 3/26</td>
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<tr>
<td></td>
<td>HW 37 – preparation of a buffer (Chapter 33 pgs 77-83)</td>
<td>Due 3/26</td>
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<tr>
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<td>HW 38 – strong acid and strong base titrations (Chapter 33 pgs 84-91)</td>
<td>Due 4/2</td>
</tr>
<tr>
<td></td>
<td>HW 39 – weak strong titrations (Chapter 33 pgs 92-97)</td>
<td>Due 4/2</td>
</tr>
</tbody>
</table>

**Online Homework** Due 4/3

**34 Solubility and Complex-Ion Equilibria**

PowerPoint: Chapter 34

<table>
<thead>
<tr>
<th>Video</th>
<th>HW 40 – solubility product constant, $K_{sp}$ (Chapter 34 pgs 1-10)</th>
<th>Due 4/6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HW 41 – $K_{sp}$ and water solubility (Chapter 34 pgs 11-16)</td>
<td>Due 4/6</td>
</tr>
<tr>
<td></td>
<td>HW 42 – $K_{sp}$ and common-ion effect (Chapter 34 pgs 17-19)</td>
<td>Due 4/9</td>
</tr>
<tr>
<td></td>
<td>HW 43 – precipitation formation (Chapter 34 pgs 20-44)</td>
<td>Due 4/9</td>
</tr>
</tbody>
</table>

**Online Homework** Due 4/17

**EXAM III: Wednesday, March 27 from 6:00-8:00 pm**
### 29 Thermochemistry
PowerPoint: [Chapters 29 & 35](#)

<table>
<thead>
<tr>
<th>video: <a href="#">Chapter 29 HW 44</a> (25:35)</th>
<th>HW 44 – First Law of Thermodynamics (<a href="#">Chapters 29 &amp; 35</a> pgs 1-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>video: <a href="#">Chapter 29 HW 45</a> (16:30)</td>
<td>HW 45 – Hess' Law (<a href="#">Chapters 29 &amp; 35</a> pgs 13-18)</td>
</tr>
<tr>
<td>video: <a href="#">Chapter 29 HW 46</a> (13:56)</td>
<td>HW 46 – standard enthalpies of formation (<a href="#">Chapters 29 &amp; 35</a> pgs 19-23)</td>
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</tbody>
</table>

**Online Homework** Due 4/23

### 35 Chemical Thermodynamics
PowerPoint: [Chapters 29 & 35](#)

<table>
<thead>
<tr>
<th>video: <a href="#">Chapter 35 HW 47</a> (23:12)</th>
<th>HW 47 – Second Law of Thermodynamics (<a href="#">Chapters 29 &amp; 35</a> pgs 24-34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>video: <a href="#">Chapter 35 HW 48</a> (42:23)</td>
<td>HW 48 – Gibbs Free Energy (<a href="#">Chapters 29 &amp; 35</a> pgs 35-54)</td>
</tr>
</tbody>
</table>

**Online Homework** Due 4/23

### 36 Electrochemistry
PowerPoint: [Chapter 36](#)

<table>
<thead>
<tr>
<th>video: <a href="#">Chapter 36 HW 49</a> (82:28)</th>
<th>HW 49 – standard reduction potentials (<a href="#">Chapter 36</a> pgs 1-41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>video: <a href="#">Chapter 36 HW 50</a> (43:32)</td>
<td>HW 50 – Nernst equation (<a href="#">Chapter 36</a> pgs 42-61)</td>
</tr>
</tbody>
</table>

**Online Homework** Due 4/26

**EXAM IV:** Wednesday May 1, from 6:00 - 8:00pm

### 37 Nuclear Chemistry
PowerPoint: [Chapter 37](#)

| video: [Chapter 37 HW 51](#) (43:08) | HW 51 - nuclear chemistry ([Chapter 37](#) pgs 1-40) |

**Online Homework** Due 4/30

**Comprehensive Final – CHEM 1312-001:** Monday, May 6, 10:30 a.m. - 12:30 p.m.
**MAKE-UP POLICY:** Make-up exams can only be given for proven excuses.

**GRADING POLICY:**
- **4-hour exams** (100 pts per test) cumulative with emphasis on the material covered since last. These exams will be given on Feb. 6, March 6, March 27, and April, 25 (from 6:00 - 8:00 pm)

  *Final Exam* – Comprehensive Final exam worth 200 pts. Exam will be given in Chemistry 106 as per University schedule. *On May 6 @ 10 - 10.50 am.*

  *Homework* – Homework will total 100 points (#points correct*1000 / total points available). The homework assignments will be completed via my website: [https://onchokechemistry.com/moodle2](https://onchokechemistry.com/moodle2) with due dates assigned on a weekly basis. Any computer capable of connecting to the internet can assess the homework system at [https://onchokechemistry.com/moodle2](https://onchokechemistry.com/moodle2) Enter your user name and access code.

  *Quizzes* (50 pts) – At least one quiz will be given per week.

  *Method of Evaluation:* The final grade will be based upon percentage of points obtained from All the Exams and Quizzes:

<table>
<thead>
<tr>
<th>Exam Schedule</th>
<th>Points</th>
<th>Day/Date</th>
<th>Approximate Material Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam I</td>
<td>100</td>
<td>Wednesday, Feb. 7, 6 - 8pm</td>
<td>Review, Chapt. 20.1- 20.2, Chaps. 14, 15</td>
</tr>
<tr>
<td>Exam II</td>
<td>100</td>
<td>Wednesday, March 6, 6-8 pm</td>
<td>Chapt. 15, Chaps. 16</td>
</tr>
<tr>
<td>Exam III</td>
<td>100</td>
<td>Wednesday, March 27, 6:00-8:00 pm</td>
<td>Chaps. 17</td>
</tr>
<tr>
<td>Exam IV</td>
<td>100</td>
<td>Wednesday, May 1, 6:00 - 8:00pm,</td>
<td>19, 20 &amp; 21</td>
</tr>
<tr>
<td>Moodle Homework (CHE 1312)</td>
<td>100</td>
<td>Per syllabus</td>
<td>Assigned via OnchokeChemistry.com</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quizzes</th>
<th>50</th>
<th>At least one Quiz per week</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive Final Exam</td>
<td>200</td>
<td>Wednesday, May 6, 10:00 am -12:30 pm</td>
<td>Comprehensive. All Material covered throughout the semester</td>
</tr>
</tbody>
</table>

**Grading scale** -  A= 90 - 100%; B= 80 - 89%; C= 70 - 79%; D= 60 - 69%; F= below 60%

**ATTENDANCE POLICY:**
Attendance of class is mandatory. A total of four unexcused absences will result in the student being dropped from the class with a grade of "F". The exams will be given during the assigned times unless other arrangements are approved by the instructor prior to the scheduled exam time.

**SEMESTER WITHDRAWALS:** Last day to withdraw from the course without obtaining WP or WF grade is Monday, April 24.

**ACADEMIC INTEGRITY (A-9.1):**
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

**Definition of Academic Dishonesty**
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better
grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp
Any student found cheating will be subject to the penalties as stated in the Student Code of Conduct handbook; including but not limited to a score of zero on exam, expulsion from the class or expulsion from the University.

Withheld Grades Semester Grades Policy (A-54):
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities:
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Classroom Behavior Policy: To ensure a classroom environment conducive to learning, any forms of classroom disruptions will not be tolerated (examples but not limited to – talking, use of cell phones/beepers, sleeping, reading other material, eating/drinking). Students who violate these rules will be asked to leave. Repeat offenders will be subject to disciplinary action in accordance with University policies as described in the Code of Student Conduct.