Instructor: Dr. Alyx S. Frantzen
Phone: 468-2338    e-mail: afrantzen@sfasu.edu
Office: M 119
Class Hours: TR 9:30-10:45am; TR 11:00-12:15pm; M 2:00-4:50 pm; T 2:00-4:50 pm; W 12:00-1:00pm;
R 1:00-2:00pm
Office Hours: MW 10:00-11:30 am; TR 8:30-9:30 pm

CATALOG DESCRIPTION: Laws, principles and theories concerning the structure of matter as related to properties.

PREREQUISITES: Chemistry 133, 134, 231; Math 233, 234

CO-REQUISITES: CHE 337L

REQUIRED TEXTS AND OTHER MATERIALS:
Lide, D.R. editor *CRC Handbook of Chemistry and Physics* (The CRC can be any edition, but try to get an edition from the 2000’s-present)

SUPPLEMENTARY MATERIALS:

COURSE GOALS: Students should learn the basic techniques, tools, and theories from the areas of Thermodynamics and Kinetics.

STUDENT OUTCOME OBJECTIVES:
Upon completion of this course students will:
- Understand the need for the fields of Thermodynamics and Kinetics.
- Derive and apply the Laws of Thermodynamics.
- Derive and apply the laws governing the fundamentals of equilibrium.
- Understand the Kinetic Theory of Gases.
- Derive and apply equations explaining the rate of reactions.
- Derive mechanisms to explain rate equations.

COURSE CONTENT: Chapters from the text will be covered in the following order.
1  ZEROTH LAW OF THERMODYNAMICS AND EQUATIONS OF STATE
2  FIRST LAW OF THERMODYNAMICS (EXAM #1)
3  SECOND AND THIRD LAWS OF THERMODYNAMICS
4  FUNDAMENTAL EQUATIONS OF THERMODYNAMICS (EXAM #2)
5  CHEMICAL EQUILIBRIUM
6  PHASE EQUILIBRIUM (EXAM #3)
8  THERMODYNAMICS OF BIOCHEMICAL REACTIONS
17  KINETIC THEORY OF GASES
18  EXPERIMENTAL KINETICS AND GAS REACTIONS (EXAM #4)
19  CHEMICAL DYNAMICS AND PHOTOCHEMISTRY
20  KINETICS IN THE LIQUID PHASE (EXAM #5)
7  ELECTROCHEMICAL EQUILIBRIUM (IF TIME PERMITS)

COURSE REQUIREMENTS: Exams will be given on Thursday Evenings from 5:30-7:30 pm. There will be a two hour time limit. The exams will be given September 14th, October 5th, October 26th, November 16th, and December 7th (Deadline for make-up exams will be November 30th).

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Week). The ACS exams have 90 minute time limits. The final will be given on the scheduled date, December 12th, but will start at 7 am to ensure enough time to finish both ACS exams. The final exam will consist of the ACS Thermodynamics and Kinetics exams.

Grades for this course will be assigned in the following manner:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Laboratory</td>
<td>30%</td>
</tr>
<tr>
<td>5 Exams</td>
<td>40%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20%</td>
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<tr>
<td>Homework/Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
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**METHOD OF EVALUATION:**
Grading scale - A= 90 - 100%; B= 80 - 89%; C= 70 - 79%; D= 60 - 69%; F= below 60%

**MAKE-UP POLICY:** There will be no make-ups in this class.

**ATTENDANCE POLICY:** Attendance is probably the single most important study aid in physical chemistry. As such, there is an attendance policy. Excused absences must be documented. The first two unexcused absences will not count against you. Upon the third unexcused absence, each absence will result in the removal of three percentage points from your final average.

**ACADEMIC HONESTY POLICY:** 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. Use of a programmable calculator is considered cheating.

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

**ACADEMIC DISABILITIES POLICY:** Students with Disabilities—To obtain disability related accommodations and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, 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.

**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.

Instructor reserves the right to change the syllabus at any time.
Tentative Schedule of Topics (Laboratory)

Some experiments can be found in your textbook and I will provide you with the others.

- Handout: Gas Thermometry
- Handout: Heat Capacity Ratio of Gases (with modification)
- Experiment 6: Heats of Combustion (Bomb Calorimetry, with modification)
- Handout: Heats of Ionic Reaction
- Experiment 13: Solid-Liquid Equilibrium in a Binary System (with modification)
- Handout: Ionization Constants of Acids
- Handout: Kinetics

We will begin with the first three experiments. Partners will be assigned. For the second set of experiments (next three experiments) we will change partners, as we will for the last experiment. Each student will submit his or her own laboratory report. Laboratory reports will be due at the beginning of the next lab period after the experiment is completed. Late labs will be graded on a 70% scale if they are turned in the same day, and will not be accepted the next day. Your laboratory grade also depends on your laboratory techniques and etiquette. An additional requirement in lab is that the lab remains clean. I am not your mother and will not clean up after you. Failure to clean up your glassware and work area to my satisfaction will result in the removal of a minimum of 20% from everyone’s grade. The format of the lab reports will be given and explained in detail before the first lab report is due.

Each student will meet with me after they get back each laboratory report. We will discuss the strengths and weaknesses of the report. We will be concentrating on writing this year.

The schedule for labs will be as follows:

9/4-10/9

During these weeks, you will finish the first three experiments. The Heats of Combustion experiment is the only one that might require two weeks to finish. Each group will begin on a different experiment.

10/16-11/27

During these weeks, you will finish the next three experiments. These experiments may take two weeks to finish. No lab on 11/20, 21, 17.

12/4-12/5

We will all be doing Kinetics at the same time. This experiment can be accomplished in one day.