CAPILANO UNIVERSITY COURSE OUTLINE			
Term:	**FALL 2016**	Course No.	**CHEM 251**
Course:	**INTRODUCTION TO PHYSICAL CHEMISTRY FOR ENGINEERS**	Credits: Section:	**3.0**
Office: Tel: email:			

COURSE FORMAT: Three hours of class time, plus an additional hour of supplemental activity delivered through on-line or other activities for a 15 week semester, which includes two weeks for final exams.

PRE-REQUISITES: CHEM 111 and MATH 116

NOTES: This is an approved Quantitative/Analytical course for baccalaureate degrees.

COURSE OBJECTIVES:

General: To develop an understanding of physical chemistry and its application to engineering processes.

Student Learning Outcomes: On completion of the course, the successful student should be able to:

- Solve gas problems using both ideal & real gas equations
- Explain the 1st, 2nd and 3rd law of thermodynamics and solve various numerical examples
- Demonstrate an understanding of the relationship between equilibrium and thermodynamics
- Use the equations developed in thermodynamics and apply them to phase changes
- Draw and interpret one component phase diagrams
- Demonstrate an understanding of the relationship between kinetics and thermodynamics
- To solve kinetic problems using various means including differential calculus
- Explain the sources of electronic, vibrational and rotational spectra

REQUIRED COURSE MATERIALS:

Textbook: Atkins Peter and de Paula Silva. Thermodynamics, Structure, and Change. 10th edition. W.H. Freeman & Company, 2014

Additional material: A graphing calculator is required.

COURSE CONTENT:

Topic	Weeks (approx)
Gases: A review of the gas laws and Dalton's law of partial pressures. An overview of the kinetic theory of gases, Van der Waals equation, the critical state and Graham's law of diffusion and effusion.	2
Thermodynamics 1: An examination of the 1st law of thermodynamics, enthalpy, heat capacities, temperature dependence of reaction enthalpies and the equipartition of energy.	2
Thermodynamics 2: An examination of the 2nd and 3rd law of thermodynamics, spontaneous and non-spontaneous processes, Carnot cycle and Gibbs free energy.	2
Thermochemistry: Temperature dependence of chemical reactions, extent of reaction and use of activities and partial molar quantities will be examined.	2
Phase Equilibria: A brief look at single component phase diagrams, the Clapeyron and the Clausius-Clapeyron equations.	2
Kinetics: A detailed examination of the rate laws and reaction order, the relationship of kinetics to thermodynamics, various processes such as parallel, consecutive, opposing, free radical, chain and enzyme catalysis.	2
Spectroscopy: An examination of electronic, vibrational and rotational spectroscopy from a physical perspective.	1
Final Exam Period	2

EVALUATION PROFILE:

Final grades for the course will be computed based on the following schedule:

Term Tests (2)	40%
Quiz/Homework Questions	15%
Final Examination	35%
Performance Evaluation	10%
TOTAL	**100%**

PERFORMANCE EVALUATION:

In the absence of exceptional circumstances, which are at the instructor's discretion, the performance evaluation component of the final grade will be prorated to the rest of the grade. For example, a 10% performance evaluation component would be determined by dividing the remaining mark out of 90 by 9. The most common circumstance justifying an increased

performance evaluation mark is a student's improved performance in the final examination relative to the midterm exam(s), which the instructor feels justifies an elevated letter grade.

SUPPLEMENTAL 4TH HOUR ACTIVITY:

Supplemental activity might be a scheduled tutorial, an on-line activity, a group meeting, or some other activity as indicated by your instructor.

GRADING PROFILE: Letter grades will be assigned according to the following guidelines:

A+ 90 - 100%	B+ 77 - 79%	C+ 67 - 69%	D 50 - 59%
A 85 - 89%	B 73 - 76%	C 63 - 66%	F 0 - 49%
A- 80 - 84%	B- 70 - 72%	C- 60 - 62%	

Students should refer to the University Calendar for the effect of the above grades on grade point average.

OPERATIONAL DETAILS:

University Policies: Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Cheating and Plagiarism, Academic Probation and other education issues. These and other policies are available on the University website.

Attendance: The student is responsible for all information given in the lectures, including times of examinations and assignment deadlines.

Missed Exams:

Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets **all** of the following conditions:

1. Circumstances are beyond the control of the student which resulted in the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do **NOT** include forgetting about the test, lack of preparation for the test, work-related or social obligations.

2. The student has notified the instructor (or the Pure and Applied Science office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification **MUST** occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances must be provided. Proof of illness or injury requires a note from a doctor, who may also be consulted.

4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. **Fully participating means attending almost all classes and turning in almost all assignments in the course**.

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Final Exam Period: Students should note that the final exam period is from **?? to ??** *(includes Saturday, ??),* and that they can expect to write exams at any time during this period. Individual exam times will not normally be rescheduled because of holidays, work, or other commitments. While efforts are made to spread exams throughout the exam period, an individual's particular course combination may result in exams being scheduled close together, or spread widely through the entire exam period.

Cheating/Plagiarism: Students caught cheating on a test will normally receive a grade of "F" on the course and may be expelled from the University. Plagiarism (including the copying of any part of assignments, laboratory reports, and essays) is a serious offence and is a form of cheating.

Incomplete Grades: Incomplete grades (“I”) are given only when special arrangements have been agreed upon with the instructor prior to the end of the semester. Since "I" grades are granted only in exceptional circumstances (usually health problems), their occurrence is rare. A student receiving an “I” grade should see the instructor.

English Usage: Students are expected to use correct standard English in their written and oral assignments, exams, presentations and discussions. Failure to do so may result in reduced grades in any part of the Evaluation Profile. Please refer to the guidelines provided in the Capilano Guide to Writing Assignments (available from the University bookstore).

Emergency Procedures: Please read the emergency procedures posted on the wall of the classroom.