GRANDE PRAIRIE REGIONAL COLLEGE
DEPARTMENT OF SCIENCE
2010/2011

CHEMISTRY 1020: Introductory University Chemistry II

CALENDAR DESCRIPTION: Lectures include chemical kinetics, thermochemistry, thermodynamics, equilibrium, acids and bases, electrochemistry, and coordination chemistry.

OBJECTIVE: Students will receive an introduction to physical chemistry. The time aspect of chemical reactions will be explored, as well as a detailed description of starting and equilibrium conditions for gaseous, aqueous, and mixed phase reactions. Students will gain an understanding of mathematically modelling the chemical reaction process.

CONTACT HOURS: 3 Lecture hours per week; 1 Seminar hour per week; 3 Laboratory hours per week

PREREQUISITE: CH1010 or equivalent

TRANSFER CREDITS: CH1020 to U. of Alberta CHEM 102, 3 credits
CH1010/1020 to U. of Calgary CHEM 201/203, 6 credits

INSTRUCTOR: Les Rawluk Office J214 780-539-2738

EMAIL: lrawluk@gprc.ab.ca

WEBSITE: http://moodle.gprc.ab.ca

OFFICE HOURS: Unrestricted

TEXT BOOK: Required: *CHEMISTRY* 8^{th} *Edition*
Steven S. Zumdahl and Susan A. Zumdahl
Houghton Mifflin Company ©2010

LABORATORY: Required lab manual: Introductory University Chemistry II (Chem 102 and 105), University of Alberta, 2010/2011
Lab coats and **safety glasses** are **compulsory**, and are available at the Bookstore.

SEMINAR: Seminars consist of problem solving, discussion of lecture materials, and a brief introduction to the upcoming Laboratory experiment. A short quiz will be part of most seminars.

COURSE EVALUATION

February Midterm	18%
March Midterm	18%
Final Exam	37%
Quizzes	5%
Laboratory Reports	12%
Laboratory Exam	10%

Alpha Grade	Approximate Percentage Conversion
A+	90–100
A	85–89
A−	80–84
B+	76–79
B	73–75
B−	70–72
C+	67–69
C	64–66
C−	60–63
D+	55–59
D	50–54
F	0–49

Assignments will be distributed on a weekly basis. Complete solutions will be available for the student in both hardcopy and electronic format. Completion of assignments is strongly recommended to succeed in the course.

Attendance to all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory; a passing grade in the laboratory component is required to pass the course. A doctor's medical note is required for **all** excused absences!

Students must obtain an overall average of 50% or better to pass the course. Students are encouraged to participate in class discussions, and help is available outside the classroom. **Appointments are not necessary.**

According to GPRC policy (see page 45 of the 2010/2011 calendar), a repeat final examination will not be granted in this course.

CH1020 COURSE CONTENT

A: Chemical Kinetics — Chapter 12 — Pages 539–592

- A.1 Reaction rates
- A.2 Rate laws
- A.3 Determining rate law form
- A.4 Integrated rate law
- A.5 Arrhenius equation
- A.6 Reaction mechanisms
- A.7 Catalysis

B: Chemical Equilibrium — Chapter 13 — Pages 593–637

- B.1 Equilibrium condition
- B.2 Mass-action expression and the equilibrium constant
- B.3 Heterogeneous equilibria
- B.4 Applications of the equilibrium constant
- B.5 Le Châtelier's Principle

C: Acids and Bases — Chapters 14 and 15 — Pages 638–737

- C.1 The nature of acids and bases
- C.2 Acid strength and the pH scale
- C.3 Calculating the pH of strong/weak acids
- C.4 Bases
- C.5 Salts
- C.6 Mixtures of weak acids and bases
- C.7 Effect of structure upon acid strength
- C.8 Common ion effect
- C.9 Buffer systems
- C.10 Acid/base titrations
- C.11 Acid/base indicators

D: Solubility Equilibria — Chapter 16 — Pages 743–771

- D.1 Slightly soluble salts
- D.2 Complex ion equilibria

E: Thermochemistry — Chapter 6 — Pages 235–283

- E.1 Types of energy; work and heat; First Law of Thermodynamics
- E.2 Enthalpy–endothermic and exothermic processes
- E.3 Calorimetry
- E.4 Hess's Law
- E.5 Standard enthalpy of formation

F: Thermodynamics — Chapter 17 — Pages 772–815

- F.1 Entropy and the Second Law of Thermodynamics
- F.2 Entropy of the system and the surroundings
- F.3 Free energy
- F.4 Free energy and equilibrium

G: Electrochemistry — Chapter 18 — Pages 816–871

- G.1 Redox reactions and standard electrode potentials
- G.2 Galvanic cells and spontaneous redox reactions
- G.3 Cell potential, electrical work, and free energy
- G.4 Dependence on concentration–the Nernst equation
- G.5 Batteries
- G.6 Electrolytic cells

H: Transition Elements and Coordination Compounds — Chapter 21 — Pages 953–1004

- H.1 Properties of the transition metals
- H.2 Coordination compounds
- H.3 Structure of coordination compounds
- H.4 Crystal field theory