



School of Arts & Science
CHEMISTRY AND GEOSCIENCE DEPARTMENT

CHEM 112-001
General College Chemistry 2
Winter 2008

COURSE OUTLINE

The Approved Course Description is available on the web @ _____

Ω Please note: this outline will be electronically stored for five (5) years only.
It is strongly recommended students keep this outline for your records.

1. Instructor Information

| | | | | |
|-----|---------------|-------------------------------------------------------|--------------------|--|
| (a) | Instructor: | Daniel Donnecke | | |
| (b) | Office Hours: | Mon and Tues, 11.30 -12.00 and Thurs, 12.00 – 1.30 pm | | |
| (c) | Location: | F 344 D | | |
| (d) | Phone: | 370-3506 | Alternative Phone: | |
| (e) | Email: | donnecked@camosun.bc.ca | | |
| (f) | Website: | N/A | | |

2. Intended Learning Outcomes

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Upon completion of this course the student will be able to:

1. Identify the major differences between organic and inorganic compounds.
2. Use the organic chemistry nomenclature system as it applies to the major organic compounds.
3. Recognize and draw the structural formulas of the major organic compounds.
4. Identify the molecular isomers, physical characteristics and chemical properties of hydrocarbons - alkanes, alkenes, alkynes and aromatic compounds.
5. Identify the molecular isomers, physical characteristics and chemical properties of alcohols, phenols, ethers and thiols.
6. Describe the structural, physical and chemical characteristics of aldehydes, ketones, carboxylic acids, esters, acid chlorides and anhydrides, amines and amides.
7. Construct structural formulas for selected simple sugars and describe the structural, physical and chemical characteristics of monosaccharides, disaccharides, starch, glycogen, cellulose and mucopolysaccharides.
8. Summarize the biological functions of lipids, and identify and account for the physical and chemical properties of fatty acids, glycerol, triacylglycerols, phospholipids, cholesterol, steroid hormones and bile salts.
9. Identify the structural characteristics of amino acids, and describe the formation and properties of the peptide bond.
10. Describe the relationship between the primary, secondary and tertiary structures of fibrous and globular proteins.
11. Compare the biological functions, chemical structures and characteristics of myoglobin and hemoglobin.

12. Recognize the chemical structures of purines and pyrimidines, and describe their functions as chemical constituents of nucleotides, RNA and DNA.
13. Describe the biological roles and structures of RNA and DNA, and account for the physical and chemical characteristics of polynucleotides.

3. Required Materials

(a) Text

Organic and Biochemistry for Today. Sixth Edition. 2008.

S.L. Seager & M.R. Slabaugh. Thomson-Brooks/Cole-Nelson, Toronto.

The textbook is required for this course.

Relevant web-based learning resources are presented in the text.

(b) Chem 112 Laboratory Experimental Protocols.

(There is no laboratory manual to be purchased for this course.)

A link to a collection of experimental procedures for several Chemistry 112 laboratory periods is found at a Camosun College Website.

<http://www.camosun.bc.ca/>

click on: *Programs & Courses*

scroll down and click on: *School of Arts & Sciences* (right side)

Under 'Departments': click on: *Chemistry & Geoscience*

click on: *Faculty* (in the menu at the top of the page)

scroll down & click on: '*Howard Duncan*' (now retired)

scroll down & click on: *Chemistry 112 Laboratory Manual*

Students can print off those protocols for individual experiments included in this offering of the course.

Protocols for experiments not included in this on-line collection will be provided in class. Any experimental protocols which will not download, or have been recently revised, will be provided as hard copies, as will protocols for new experiments in the course.

(c) General Materials and Supplies

Safety glasses: Safety glasses are required when handling hazardous chemicals or biochemicals. Each student is required to provide her or his pairs of safety glasses. Students lacking safety glasses will not be permitted to work in the laboratory.

Lab coats: Lab coats are required for any experiments involving hazardous chemicals or biochemicals. Each student is required to provide her or his lab coat. Students lacking lab coats when required will not be permitted to work in the laboratory.

Latex gloves: Latex or 'non-allergenic' gloves will be available in the lab and are to be used to protect the skin from potentially hazardous chemicals or to protect valuable biochemicals from becoming degraded by enzymes from the skin.

Scientific calculator: Calculators may be required in the lab, in class and during tests or exams. Each student is required to provide her or his own calculator.

4. Course Content and Schedule

(Can include: class hours, lab hours, out of class requirements and/or dates for quizzes, exams, lectures, labs, seminars, practicums, etc.)

| | |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Credits | 4 credits |
| In-class workload | Three 50-minute lectures per week. One three-hour lab period per week*. *This period is also used to host term tests and a final exam review session. |
| Out-of-class workload | 6 hours per week |
| Number of weeks | 14 weeks |
| Pre-requisite | Chem 110 or Chem 12 |

Course Times and Locations

| | |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lectures | Mondays 12:30 to 1:20 PM Fisher Building, Room F300 |
| | Tuesdays 12:30 to 1:20 PM Fisher Building, Room F310 |
| | Fridays 12:30 to 1:20 PM Fisher Building, Room F336 |
| Laboratory Periods | Wednesdays 10:30 AM to 1:20 PM* Fisher Building, Room F354 *This period will also be used for term tests, and for a review period prior to the final exam. <i>Please see the laboratory and test schedule below.</i> |

Lecture Outline

Introduction to Organic Compounds; Alkanes

Chapter 1

Organic and Inorganic Compounds; Hydrocarbons; Isomers; Functional Groups; Structures, Conformations, Nomenclature and Properties of Alkanes, including Cycloalkanes; Reactions of Alkanes.

Unsaturated Hydrocarbons

Chapter 2

Structures, Nomenclature, Properties and Reactions of Alkenes, Alkynes and Aromatic Hydrocarbons; Alkyl Halides.

Alcohols, Phenols, & Ethers

Chapter 3

Structures, Nomenclature, Classification, Properties and Reactions of Alcohols, Phenols, Ethers, and Thiols.

Aldehydes & Ketones

Chapter 4

Physical and Chemical Properties, Nomenclature, Reactions and Biochemical Relevance of Aldehydes and Ketones.

Carboxylic Acids & Esters

Chapter 5

Physical and Chemical Properties, Nomenclature, Reactions and Biochemical Relevance of Carboxylic Acids and Esters.

Amines & Amides

Chapter 6

Structures, Classifications, Nomenclature, Physical & Chemical Properties, Reactions and Biochemical Relevance of Amines and Amides.

Carbohydrates

Chapter 7

Biochemical Properties and Stereochemistry of Monosaccharides (glucose, fructose and ribose); Biochemical Nature of Disaccharides (maltose, lactose and sucrose) and Polysaccharides (starch, glycogen, cellulose and heteroglycans).

Lipids

Chapter 8

Classification, Structures, Nomenclature and Properties of Saturated and Unsaturated, Essential and Trans-Unsaturated Fatty Acids, Triacylglycerols and other Fats and Oils; Phosphoglycerides, Sphingolipids and Biological Membranes; Biochemistry of Cholesterol & Steroids; Steroid Hormones, Bile Salts & Prostaglandins.

Proteins

Chapter 9

Structures and Properties of Amino Acids; Peptide Bonds; Primary, Secondary, Tertiary and Quaternary Protein Structures; Characteristics and Functions of Proteins.

Enzymes

Chapter 10

Biochemical Characteristics of Enzymes and Enzyme Cofactors. Clinical Applications of Enzymes.

Nucleic Acids & Protein Synthesis

Chapter 11

Purines and Pyrimidines; Nucleotides; Structure and Composition of Ribonucleic Acid (RNA) and Deoxyribonucleic Acid (DNA); RNA Transcription & Protein Translation; Recombinant DNA Technology.

Nutrition & Energy for Life

Chapter 12

Macronutrients & Micronutrients; ATP, Coenzymes, Metabolism & Bioenergetics.

Carbohydrate Metabolism

Chapter 13

Carbohydrate Digestion & Blood Glucose; Glycolysis; The Krebs' (Citric Acid) Cycle; Electron Transport and Oxidative Phosphorylation; Glycogen Metabolism; Gluconeogenesis; Hormonal Regulation of Carbohydrate Metabolism.

Lipids & Amino Acid Metabolism

Chapter 14

Blood Lipids & Fat Mobilization; Cholesterol Metabolism; Energy from Stored Fats (triacylglycerides, fatty acids) & Ketone Bodies; Amino Acid Metabolism & Nitrogen Balance.

Body Fluids

Chapter 15

Oxygen and Carbon Dioxide Transport - Roles of Myoglobin and Hemoglobin; Fluid and Electrolyte Balance; Regulation of Blood pH.

Laboratory Experiments & Term Tests Schedule

Wednesday, January 09th. Lab & Safety Orientation 1.5 to 2 h

Wednesday, January 16th. Experiment 1. Melting Points & Identification Organic Compounds

Wednesday, January 23rd. Experiment 2. Molecular Models of Hydrocarbons

Wednesday, January 30th. Experiment 4. Aldehydes, Ketones, and Carboxylic Acids

Wednesday, February 06th. **Term Test #1.**

Wednesday, February 13th. Experiment 5. Esters

Wednesday, February 20th. Experiment 7. Identification of Organic Functional Groups

Wednesday, February 27th. **Term Test #2.**

Wednesday, March 05th. Experiment 8. Enzymatic Determination of Glucose and Cholestyrol

Wednesday, March 12th. Experiment 9. Paper Chromatographic Separation of Amino Acids

Wednesday, March 19th. Experiment 13. DNA Fingerprinting Analysis

Wednesday, March 26th. **Term Test #3.**

Wednesday, April 02th. Experiment 14. In Search of the Kissing Disease

Wednesday, April 09th. Final Exam Review - Biochemistry.

Final Exam: The time and location of the Chem 112 Final Exam will be published by the College during the Semester.

5. Basis of Student Assessment (Weighting)

(Should be linked directly to learning outcomes.)

(a) Laboratory Experiments & Reports

Attendance in the lab periods is mandatory. No laboratory experiment can be missed without an acceptable reason submitted in writing (such as a suitable note from a Medical Doctor). Laboratory reports are due in the following lab period, unless otherwise stated. Each lab partner must hand in a separate report even though lab partners typically share equally in experimental work. The value the lab reports contribute to the final grade is 20%. Each lab report is of equal value.

(b) Term Tests

Three 90 min. term tests, each contributing a value of 15% to the final grade, will compose 45% of the final grade. As indicated above, they are scheduled for **February 6th**, **February 27th** and **March 26th** in the Wednesday period normally used for a laboratory experiment.

If any test is missed due to illness or any other justifiable reason, a student may either be exempt from that test (i.e. it will not factor into the calculation of the final grade), or may choose to add the percentage value of that quiz or test to that of the final exam.

(c) Final Exam

The final exam is a comprehensive exam but emphasizes the biochemistry portion of the course. The value this exam contributes to the final grade is 35%. *The time and location of the Chem 112 final exam will be published by the College during the Semester.*

Attendance at the final exam is mandatory. Appropriate documentation must accompany an explanation for absence.

6. Grading System

(No changes are to be made to this section, unless the Approved Course Description has been forwarded through EDCO for approval.)

Standard Grading System (GPA)

| Percentage | Grade | Description | Grade Point Equivalency |
|------------|-------|-------------|-------------------------|
| 90-100 | A+ | | 9 |
| 85-89 | A | | 8 |
| 80-84 | A- | | 7 |
| 77-79 | B+ | | 6 |
| 73-76 | B | | 5 |
| 70-72 | B- | | 4 |

| | | | |
|-------|----|-----------------------------------------------------------------------------------------------------------------------|---|
| 65-69 | C+ | | 3 |
| 60-64 | C | | 2 |
| 50-59 | D | Minimum level of achievement for which credit is granted; a course with a "D" grade cannot be used as a prerequisite. | 1 |
| 0-49 | F | Minimum level has not been achieved. | 0 |

Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy E-1.5 at camosun.ca for information on conversion to final grades, and for additional information on student record and transcript notations.

| Temporary Grade | Description |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I | <i>Incomplete:</i> A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family. |
| IP | <i>In progress:</i> A temporary grade assigned for courses that, due to design may require a further enrollment in the same course. No more than two IP grades will be assigned for the same course. <i>(For these courses a final grade will be assigned to either the 3^d course attempt or at the point of course completion.)</i> |
| CW | <i>Compulsory Withdrawal:</i> A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement. |

7. Recommended Materials or Services to Assist Students to Succeed Throughout the Course

LEARNING SUPPORT AND SERVICES FOR STUDENTS

There are a variety of services available for students to assist them throughout their learning. This information is available in the College calendar, at Student Services or the College web site at camosun.ca.

STUDENT CONDUCT POLICY

There is a Student Conduct Policy **which includes plagiarism**. It is the student's responsibility to become familiar with the content of this policy. The policy is available in each School Administration Office, at Student Services and on the College web site in the Policy Section.

ADDITIONAL COMMENTS AS APPROPRIATE OR AS REQUIRED