

BIOMEDICAL

Option for the

B.Sc. Degree Program in Chemical Engineering

UNIVERSITY OF ALBERTA

Department of Chemical and Materials Engineering

UNIVERSITY OF ALBERTA

FIRST YEAR ENGINEERING

TERM 1

CHEM 103 – Introductory University Chemistry I

ENGG 100 – Orientation to the Engineering Profession I

ENGG 130 – Engineering Mechanics

MATH 100 – Calculus I

PHYS 130 – Wave Motion, Optics & Sound

COMPLEMENTARY STUDIES ELECTIVE

TERM 2

CHEM 105 – Introductory University Chemistry II

ENGG 101 – Orientation to the Engineering Profession II

ENCMP 100 – Computer Programming for Engineers

EN PH 131 - Mechanics

MATH 101 – Calculus II

MATH 102 – Applied Linear Algebra

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TERM 3

BIOL 107 – Introduction to Cell Biology

CME 200 – Introduction to Chemical & Materials Engineering

CME 265 – Process Analysis

CHEM 261 – Organic Chemistry I

CH E 243 – Engineering Thermodynamics

MATH 209 – Calculus III

ENGLISH ELECTIVE

TERM 4

BIOCH 200 – Introductory Biochemistry **or**

BIOL 201 – Eukaryotic Cellular Biology **or**

CELL 201 – Introduction to Molecular Cell Biology

E E 239 – Fundamentals of Electrical Engineering

MAT E 252 – Materials Science II

MATH 201 – Differential Equations

STAT 235 – Introductory Statistics for Engineers

IMPACT OF TECHNOLOGY ON SOCIETY ELECTIVE

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TERM 5

CH E 312 – Fluid Mechanics

CH E 343 – Chemical Engineering Thermodynamics

CH E 351 – Chemical Engineering Laboratory

CH E 374 – Computational Methods in Engineering

BME 210 – Human Anatomy and Physiology: Cells and Tissue

TERM 6

CH E 314 – Heat Transfer

CH E 318 – Mass Transfer

CH E 345 – Chemical Reactor Analysis I

CH E 358 – Process Data Analysis

ENGG 310 – Engineering Economy **or**

ENGG 401 – Fundamentals of Engineering Management

BME 211 – Human Anatomy and Physiology: Systems

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TERM 7

CH E 446 – Process Dynamics & Control

CH E 464 – Chemical Engineering Design I

CME 481 – Colloquium I

CH E 416 – Equilibrium Stage Processes

PHIL 386 – Philosophy Health & Care

TECHNICAL ELECTIVE

TERM 8

CH E 454 – Chemical Engineering Project Laboratory

CH E 465 – Chemical Engineering Design

CME 483 – Colloquium II

ENGG 400 – The Practice of the Engineering Profession

COMPLIMENTARY STUDIES ELECTIVE

TECHNICAL ELECTIVE

* Choose 2 of the following 3 courses as Technical Electives:

- *CH E 484 – Introduction to Biochemical Engineering*
- *CH E 582 – Introduction to Biomaterials*
- *MAT E 458 – Nanomaterials for Biological Applications*

BIOL 107 - Introduction to Cell Biology

Course Introduction

This is one of two introductory biology courses taught by the Department of Biological Sciences. The other course, BIOL 108, is completely independent of BIOL 107. The courses can be taken in either order or concurrently.

In the 2006/7 year there were three sections in fall term, two sections in the winter term and one section in the spring term. Next year will probably be the same. This course is also offered in French at Campus Saint-Jean.

Prerequisites

The prerequisites for BIOL 107 are Biology 30 and Chemistry 30 although we usually waive these requirements once the instructor has had a chance to discuss the situation with the student. BIOL 107 itself leads on to BIOL 207 (Genetics) and BIOL 201 (Eukaryotic Cell Biology).

Course Components

During the fall and winter terms there are either three 50 minute or two 75 minute lectures a week as well as one 3 hour lab. Students also need to sign up for a weekly 1 hour seminar but there are only about four seminars during the term.

Course Weight Breakdown

Writing Assignment	10%
Lecture Midterm Exam	15%
Overall Lab Mark	40%
Lecture Final Exam	35%

Required Text Book

Students taking the course are expected to purchase a copy of the textbook Campbell and Reece “Biology, seventh edition” and a copy of the lab manual. Some BIOL 107 instructors support older editions of the text book.

Course Syllabus

The course covers four major topics:

- 1) Parts of the cell (macromembranes, classification of life, cell membranes, cell walls, prokaryotic and eukaryotic cell structure), cytoskeleton, & cell movement)
- 2) Cell energetics (photosynthesis, glycolysis, fermentation, & cellular respiration)
- 3) Cell division (prokaryotic and eukaryotic)
- 4) Information in cells (DNA replication, RNA synthesis, & protein synthesis)

The topics listed above are always covered in BIOL 107. However, each instructor expands upon this list based upon what they themselves find interesting. I for example put more emphasis on the various ways by which cells can move and I also cover two additional topics;

(i) viruses, viroids, and prions and (ii) the evolution of metabolism.

BIOL 201 – Eukaryotic Cellular Biology

Course Introduction

This course follows from BIOL 107. While several of the topics are the same the emphasis is quite different. In BIOL 107 we discuss what is found within cells while in this course we discuss how cells work and how they are studied.

In the 2006/7 year there were two sections in fall term, one section in the winter term and one section in the summer term. Next year will probably be the same. This course is also offered in French at Campus Saint-Jean.

As of summer 2006, this course is somewhat different in content and substantially different in structure than it was before. We reduced the number of topics we covered and have used the time gained to discuss the experimental evidence for what we know about cells.

Course Components & Breakdown

There are four take home assignments. In each assignment, students read a journal article and then answer a page of questions about the background, results, and conclusions presented.

Assignments	30%
Midterm	30%
Final	40%

Required Text Book

Students taking the course are expected to purchase a copy of the textbook Becker et al., (2006) “The world of the cell, sixth edition”. Earlier editions of the text are not supported.

Course Syllabus

There is a small amount of variation in the topics covered between instructors. When I teach the course my lecture outline is as follows:

A. How cells are studied

Cell biology techniques

Molecular genetics techniques

What is a cell?

B. How cells work

Organelles - nucleus, ER, Golgi apparatus, vesicles, lysosomes, peroxisomes, mitochondria, chloroplasts, plasma membrane

Cytoskeleton - microtubules, actin filaments, intermediate filaments

Extracellular matrix

C. How cells move and communicate

Muscle cells

Action potentials

Neurons

Motor neurons and neurotoxins

Non-neuronal cell signaling

D. How cells divide

Cell cycle - overview, regulation, chromosome behaviour

Apoptosis

Cancer

PHIL 386 – Philosophy And Health Care

Course Introduction and Policies

This course is an introduction to the study and critical discussion of health care ethics in a Canadian context. It begins by surveying some of the basic ideas in moral theory and practical ethics, pluralism and multiculturalism, resource allocation and health services in Canada, as well as the role of autonomy, competency, and consent. It then moves to more specific considerations of health care policies and dilemmas such as research involving human subjects, reproductive technologies, genetics, and euthanasia. The role of reason, experience and feeling as primary components in moral decisions and resolution will guide this course and this will allow the student to develop critical skills in writing, reading, interpretation, as well as discussion in regards to the material covered.

This course is an organized and objective experience and it is expected that students will come to class fully prepared and having read the assigned passages for each session. On those days that are designated for discussion, students will fully and completely participate in a mannerly and stimulating way, producing whatever assignment I ask of the group. Late penalties for assignments apply and attendance is duly noted in the mark for participation. Mid-term examinations and final examinations must be attended or a physician's note is required.

Consult the *Academic Calendar* for all matters pertaining to plagiarism and the penalties for plagiarizing other writer's ideas and work into your own without citation, as well as any other academic offences or legislative questions. In this regard, no student shall represent another's substantial editorial or compositional assistance on an assignment as their own. The specific policies and University legislation concerning plagiarism will be outlined at the beginning of the course. However, no student shall submit in any course or program of study, without the written approval of the course instructor, all or a substantial portion of any academic writing, essay, thesis, research report, project assignment, presentation or poster for which credit has been obtained by the Student or which has been or is being submitted by the Student in another course or program of student in the University or elsewhere. Additionally, the general policy concerning student conduct is as follows:

“The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty

and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behavior (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behavior which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.” (GFC 29 SEP 2003) “Policy about course outlines can be found in ' 23.4(2) of the University *Calendar*.” (GFC 29 SEP 2003).

Required Text Book

Baylis, Francoise, Downie, Jocelyn, Hoffmaster, Barry Sherwin, Susan (Eds.). *Health Care Ethics In Canada* (2nd Edition). Toronto: Nelson, 2004.

Course Weight Breakdown

Midterm Examination	25%
Discussion Participation	10%
Term Essay	30%
Final Examination	35%

Other Comments

There are no labs in this course. It is suggested that a 100-level Philosophy course is taken before registering in PHIL 386.