The University Of Western Ontario
Faculty of Engineering

DEPARTMENT OF CHEMICAL AND BIOCHEMICAL ENGINEERING

CBE 2220A – Chemical Process Calculations
Course Outline 2018-2011

Description
The objective of this course is to introduce second year students to the field of chemical and biochemical engineering. The basic concepts employed in chemical and biochemical engineering will be covered. Examples of chemical, biochemical, and environmental industries will be presented. New directions in chemical and biochemical engineering will be introduced.

Prerequisites
Applied Mathematics 1411A/B, 1413, Chemistry 1024A/B or the former Chemistry 1050, 1020 or 023, Physics 1401A/B or the former Physics 1026

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you will be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Corequisites
None

Antirequisites
None

Contact Hours:
3 lecture hours, 2 tutorial hours, 0.5 course.

Instructor:
Dr. Amarjeet Bassi (TEB 430) Telephone: 519-661-2111 ext. 88324 email: abassi@uwo.ca

Undergraduate Assistant
(TEB 477) Telephone: 519-661-2111 ext: 82131 email: cbeugrad@uwo.ca
Suggested Text

Lecture Materials
Lecture materials will be available for download from the course website on OWL.

Units
SI, FPS, and CGS units will be used.

General Learning Objectives

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<td>Problem Analysis</td>
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Legend: I = evaluated at introductory level

The general objectives of the course are for students to be able to:
- Identify common processes in chemical and biochemical engineering
- Recognize the key process parameters in engineering design problems
- Utilize effective and efficient strategies to solving material and energy balances of chemical processes

Specific Learning Objectives
Unit I: Introductory Concepts
By the end of the first unit, students should understand or become familiar with
- What is chemical and biochemical engineering
- Common chemical and biochemical engineering processes
- Engineering units and conversion between units of different systems
- Dimensional consistency and dimensionless groups
- Accuracy, precision and significant figures
Unit II: Material Balances:
By the end of the second unit, students should be able to
- Understand the principles of material balances
- Find solution strategies for (and perform degree-of-freedom analysis) of material balance problems
- Perform material balances in a single unit
- Perform material balances involving multiple units, recycle, bypass and purge streams
- Integrate chemical reaction and elemental balances into material balances
- Identify limiting and excess reactants, calculate fractional conversion and fractional yield

Unit III: Energy Balances:
By the end of the third unit, students should be able to
- Understand forms of energy and energy exchange
- Perform a combined material and energy degree-of-freedom analysis
- Estimate the physical properties of process streams
- Perform energy balances in non-reacting and reacting systems

Evaluation
Tutorial work submission and/or in-class quizzes, assignments 25%
Mid-term Examination 25%
Final Examination 50%

Both the Mid-term and the Final Examination may be limited open book or closed book. The final examination will be 3 hours in length.

Notes
1) Students must pass the final examination to pass this course. Students who fail the final examination will be assigned 48% if the aggregate mark is more than 50% or the aggregate mark.
2) Assignments are to be handed in to the CBE 2220A locker in TEB on the specified due date provided by the Instructor. Assignments will only be accepted until a specified time and date. Late assignments will receive a mark of zero. It is the student’s responsibility to ensure all of his/her assignments have been submitted, marked and returned.

Repeating All Components of the Course
In accordance with Senate and Faculty Policy, students who have failed an Engineering course (i.e. <50%) must repeat all components of the course. No special permissions will be granted enabling a student to retain laboratory, assignment or test marks from previous years. Previously completed
assignments and laboratories cannot be resubmitted for grading by the student in subsequent years.

**Use of English**
In accordance with Senate and Faculty Policy, students may be penalized up to 10% of the marks on all assignments, tests, and examinations for the improper use of English. Additionally, poorly written work with the exception of the final examination may be returned without grading. If resubmission of the work is permitted, it may be graded with marks deducted for poor English and/or late submission.

**Attendance**
Attendance in lectures, laboratories and tutorials is mandatory. Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Dean (after due warning has been given). On the recommendation of the Department concerned, and with the permission of the Dean, the student will be debarred from taking the regular examination in the course.

**Cheating**
University policy states that cheating is a scholastic offence. The commission of a scholastic offence is attended by academic penalties, which might include expulsion from the program. If you are caught cheating, there will be no second warning (see Scholastic Offence Policy in the Western Academic Calendar).

**Plagiarism**
Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). The University of Western Ontario has software for plagiarism checking. Students may be required to submit their work in electronic form for plagiarism checking.

**Conduct**
Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

**Sickness and Other Problems**
Students should immediately consult with the instructor or Department Chair if they have any problems that could affect their performance in the course. Where appropriate, the problems should be documented. The student should seek advice from the Instructor or Department Chair regarding how best to deal with the problem. Failure to notify the Instructor or Department Chair immediately (or as soon as possible thereafter) will have a negative effect on any appeal. If under special circumstances, a student is given permission to write a special examination, the student
should understand that the format of the special examination may differ from the format of the regular final or midterm examination. Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

**Notices**
Students are responsible for regularly checking their Western email, the website of the course on OWL and notices posted on Instructors' doors.

**Consultation**
Students are encouraged to discuss problems with their teaching assistant and/or instructor in tutorial sessions. Office hours will be arranged for the students to see the instructor and teaching assistants. Other individual consultation can be arranged by appointment with the appropriate instructor.

**Accreditation (AU) Breakdown**
Engineering Science 100%