

ENGG*3830 Bio-Process Engineering

Fall 2016



(Revision 1: September 02, 2016)

1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Ping Wu, *P.Eng.*
Office: THRN 2401
Email: pingwu@uoguelph.ca
Office hours: TBA on Courselink or by appointment

1.2 Lab Technician

Technician: Jacqueline Fountain
Office: THRN 1102, ext. 56676
Email: fountain@uoguelph.ca

1.3 Teaching Assistants

Not applicable

2 LEARNING RESOURCES

2.1 Course Website

Course materials, news, announcements, and grades will be regularly posted to the ENGG*3830 Courselink site. You are responsible for checking the site regularly.

2.2 Required Resources

1. McCabe, W.L., Smith, J.C. and Harriott, P. 2005. Unit Operations of Chemical Engineering. 7th Edition. McGraw-Hill, Inc. New York.
2. Earle, R. 1983. Unit Operations in Food Processing. Web Edition.
<http://www.nzifst.org.nz/unitoperations>

2.3 Recommended Resources

1. Geankoplis, C. 2003. Transport Process and Unit Operations. 4th Edition. Prentice Hall, Inc. New York.
2. Heldman, D.R., and Singh, R.P. 1981. Food Process Engineering. 2nd Edition. AVI Publishing Company, Inc. Connecticut.
3. Rizvi, S.S.H. and Mittal, G.S. 1992. Experimental Methods in Food Engineering. Van Nostrand and Reinhold, New York.
4. Singh, R.P. and Heldman, D.R. 2013. Introduction to Food Engineering. 5th Edition. Academic Press. Massachusetts.

2.4 Additional Resources

Lecture Information:

All lecture notes will be posted on courselink.

Lab Information:

The handouts for all the lab sessions will be given out at the lab.

Assignments:

Assignments will be given out on various topics. It is not required for the students to submit the assignments for marking. However, students are strongly encouraged to complete them. Solutions of all the assignments will be made available on the course web page.

2.5 Communication & Email Policy:

Please use lectures and lab help sessions as your main opportunity to ask questions about the course. Major announcements will be posted to the course website. **It is your responsibility to check the course website regularly.** As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student.

3 ASSESSMENT

3.1 Dates and Distribution

Mid-term Exam: 25%

In class - Wednesday, October 26, 2016.

Project: 25% (20% written report & 5% oral presentation)

20% - written report (due on November 04, 2016)

5% - oral presentation in class or tutorial after submission of written report (date(s) to be announced on CourseLink or in class)

Note: Both paper and electronic copies are to be submitted

Final Exam: 50%

Tuesday, Dec 13, 2016

1900hr -2100hr, Room TBA on Webadvisor

3.2 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Passing grade: In order to pass the course, you must pass the final exam portion of the course portions. Students must obtain a grade of 50% or higher on the exam portion of the course in order for the remaining portions of the course to count towards the final grade.

Missed quiz/test: If you miss a quiz/test due to grounds for granting academic consideration or religious accommodation, the weight of the missed quiz/test will be added to the final exam. There will be no makeup quizzes/tests.

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the instructor to complete a makeup lab.

Late Lab Reports: Not applicable.

4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

Application of engineering principles to the processing of biological products in the biological and food industry. Analysis and design of unit processes such as sedimentation, centrifugation, filtration, milling and mixing involving rheology and non-Newtonian fluid dynamics of biological materials. Analysis of heat and mass balances for drying evaporation, distillation and extraction.

Prerequisite(s): ENGG*2230, ENGG*2660

Corequisite(s): ENGG*3260

4.2 Course Aims

The aim of this course is to familiarize the students with different unit operations used in biological engineering, bioprocess engineering and food engineering. The students will learn to use different engineering techniques and system analysis tools to analyze, appraise and design these unit operations involving heat and mass transfer, mixing and separation technologies.

4.3 Learning Objectives

After successfully completing the course, students will have demonstrated the ability to:

1. Analyze unit operations for biological processes using the techniques of engineering and system analysis
2. Appraise and quantify processes used for the recovery of biological materials in unit operations
3. Explain and design unit operations involving simultaneous heat and mass transfer

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	1, 2, 3	Exam, Project
2. Problem Analysis	1, 2, 3	Exam, Project
3. Investigation	2, 3	Exam, Project
4. Design	3	Project
5. Use of Engineering Tools	1	Exam
6. Communication	3	Project
7. Individual and Teamwork	-	-
8. Professionalism	-	-
9. Impact of Engineering on Society and the Environment	1	Exam

10. Ethics and Equity	-	-
11. Environment, Society, Business, & Project Management	-	Project
12. Life-Long Learning	3	Project

4.5 Instructor’s Role and Responsibility to Students

The instructor’s role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on CourseLink/D2L but these are not intended to be stand-alone course notes. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and project.

4.6 Students’ Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and tutorials. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

4.7 Relationships with other Courses & Labs

Previous Courses:

ENGG*2230: Application of the conservation of mass and energy laws

ENGG*2660: Using a “systems” approach for problem investigation and analysis

Same Semester Courses:

ENGG*3260: Foundations of thermodynamics

Follow-on Courses:

ENGG*4300: Foundations of food processing design

ENGG*4380: Foundations of bioreactor design

ENGG*4110: Foundations of bioprocessing for related 41X project

5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:

Monday	1300hr – 1420hr	ROZH 108
Wednesday	1300hr – 1420hr	ROZH 108

Tutorials/Demo Laboratory:

Tuesday	1430hr - 1520hr	MCKN 309 or THRN 1104 (TBA on CourseLink or in class)
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5.2 Lecture Schedule

The following is the general breakdown of topics that will be covered on any given week. There may be variations depending students' interest.

Week	Lecture Topics	References	Learning Objectives
1	Mass and Energy Balance	Earles Chapter 1 & 2	1
2	Mass and Energy Balance	Earles Chapter 1 & 2	1
3	Heat Transfer	Earles Chapter 5	1, 2
4	Thermal Processing	Earles Chapter 6	1, 2, 3
5	Evaporator	McCabe Chapter 16	1, 2, 3
6	Drying	McCabe Chapter 24	1, 2, 3
7	Drying	McCabe Chapter 24	1, 2, 3
8	Particulate Solids	McCabe Chapter 28	1, 2
9	Mechanical Separation	McCabe Chapter 29	1, 2
10	Mechanical Separation	McCabe Chapter 29	1, 2
11	Extraction/Leaching	McCabe Chapter 20	1, 2, 3
12	Extraction/Leaching	McCabe Chapter 20	1, 2, 3
	Additional topics if time permits		

5.3 Tutorial/Demo Lab Schedule

TBA on CourseLink or in class.

5.4 Lab Schedule

Not applicable

5.5 Other Important Dates

08 September 2016, Thursday: First day of class

10 October 2016, Monday: Thanksgiving holiday

11 October, 2016 Tuesday: Study break day

04 November 2016, Friday: 40th class day, last day to drop classes

02 December 2065, Friday: Last day of class (Monday schedule in effect)

6 LAB SAFETY

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

7 ACADEMIC MISCONDUCT

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:

<http://www.academicintegrity.uoguelph.ca/>

Please also review the section on Academic Misconduct in your [Engineering Program Guide](#).

The School of Engineering has adopted a Code of Ethics that can be found at:

<http://www.uoguelph.ca/engineering/undergrad-counselling-ethics>

8 ACCESSIBILITY

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at [519-824-4120](tel:519-824-4120) ext. 56208 or email csd@uoguelph.ca or see the website: <http://www.uoguelph.ca/csd/>

9 RECORDING OF MATERIALS

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

10 RESOURCES

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs:

<http://www.uoguelph.ca/registrar/calendars/index.cfm?index>