McMaster University ENGINEERING | mohawk | W BOOTH SCHOOL OF ENGINEERING PRACTICE AND TECHNOLOGY
McMaster-Mohawk Bachelor of Technology Partnership

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2017	
Course Name	Industrial Biotechnology	
Course Code	BIOTECH 3B03	
Date(s) and Time(s) of lectures	Monday 11:30-12:30 Thursday 10:30-12:30	
Program Name	Biotechnology	
Calendar Description	A continuation of Biotechnology concepts including a more in depth application of the recombinant technology and gene expression systems. Applications include microbial, plant, and animal biotechnology, bioremediation, cloning and stem cell technology.	
Instructor(s)	Dr. Faiez Alani (Lecture) Nazia Pathan(Lab)	E-Mail: alanif@mcmaster.ca Office Hours & Location: Monday 1:30-2:30 pm Tuesday 1:30-2:30pm Or by appointment, ETB 121A E-mail: pathann@mcmaster.ca Office Hours & Location: Wednesday 11:30am -2:30PM, ETB209 or by appointment

2. COURSE SPECIFICS

Course Description

The course will cover topics in biotechnology such as bioprocess and fermentation technology, application of molecular biology concepts in genome management with application in industry such as strain development and genetic engineering of prokaryotic and eukaryotic cells. The enzyme biotechnology and the different techniques used such as immobilized enzymes and bed-backed bioreactors. Application of biotechnology in medicine; bioenergy and food industries.

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	38
L	Laboratory	30
T	Tutorial	n/a
DE	Distance education	n/a
	Total Hours	68

Resources

ISBN	Textbook Title & Edition	Author & Publisher
ISBN: 9780511802751	Biotechnology, 5th edition	John E. Smith, Cambridge

Other Supplies	Source
avenue to learn Labster simulation	http://avenue.mcmaster.ca www.labster.com

Prerequisite(s)	BIOTECH 2B03, 2GT3, 2MB3
Corequisite(s)	n/a
Antirequisite(s)	n/a
Course Specific Policies	The attendance of lectures is strongly encouraged and there are many quizzes and participation marks. Students should attend all laboratory sessions and submit lab report. Absence from lab with no well documented excuse or failure

	to submit the report in time result with F grade in that lab. It is the responsibility of the student to download Lab. procedures from lab manual on-line (Avenue to learn). There is no make-up policy in the term tests and quizzes for this course. If the student missed any midterm then the percentage of the final will be increased to compensate the missing midterms if the student has well documented and approved report for the absence (See MSAF information below). Students must pass both components of the course –labs and lectures - to pass the course. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor. The instructor may also use other software including: e-mail, Avenue, LearnLink, web pages, capa, Moodle, Thinking Cap, etc. The communications via email is strictly by Official Mcmaster University Account, no reply to the commercial emails and/or nick names. Late submissions of assignments and Lab report will be penalized 10% per day within one week.
Departmental Policies	Students must maintain a GPA of 3.5/12 to continue in the program. In order to achieve the required learning objectives, on average, B.Tech. students can expect to do at least 3 hours of "out-of-class" work for every scheduled hour in class. "Out-of-class" work includes reading, research, assignments and preparation for tests and examinations. Where group work is indicated in the course outline, such collaborative work is mandatory. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals that are not in class. Instructor has the right to submit work to software to identify plagiarism.

3. SUB TOPIC(S)		
Week 1	Nature of biotechnology and development	Ch1
Week 2	Biomass: a biotechnology substrate: Natural raw materials, raw materials and the future of biotechnology **Quiz 1**	Ch2
Week 3	Genome management: Genetic manipulation, Industrial genetics **Case study1**	Ch3
Week 4	Genome management: strain development and Genetic engineering **Quiz 2**	Ch3
Week 5	Bioprocess: Principles of microbial growth, media design, solid –substrate fermentation, and mammalian cell culture technology. **Case study 2**	Ch4

Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Week 7	Enzyme Technology: The nature of enzymes, production of enzymes and application. **Quiz 3** **Project presentation**	Ch5
Week 8	Biofuel and Bioenergy: Bioethanol from biomass, biodiesel, methane, and hydrogen. **Case study 3** **Project presentation**	Ch6
Week 9	Environmental Biotechnology: Waste treatment, bioremediation, Environmental sustainability and clean technology. **Term Test** **Project presentation**	Ch7
Week 10	Food Biotechnology: Probiotics and functional food Sweeteners, organic acids and polysaccharides. **Quiz 4** **Project presentation**	Ch10
Week 11	Medical biotechnology: Antibiotics, vaccines and monoclonal antibodies, biopharmaceuticals **Case study 4** **Project presentation**	Ch11
Week 12	Medical biotechnology: therapeutic proteins, gene therapy. **Project presentation** **Quiz 5** **Project final Report due**	Ch11
Week 13	Stem cell biotechnology: The nature of stem cells and cultivation, commercial potential for stem cell therapies. **Case study 5** **Review**	Ch12
Classes end: Wednesday, December 6, 2017 Final examination period: Friday, December 8 to Thursday, December 21, 2017 All examinations MUST be written during the scheduled examination period.		
List of experiments		
Lab 1	Introduction and Biosafety	
Lab 2	Real Time PCR (qPCR)	
Lab 3	Transformation and purification of green Fluorescent Protein	
Lab 4	Blue/white cloning and ß-galactosidase assay	
Lab 5	Cloning and Sequencing of GAPDH Part 1: Extraction of Genomic DNA	
Lab 6	Cloning and Sequencing of GAPDH Part 2A: Amplification with nested PCR	
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Lab 7	Cloning and Sequencing of GAPDH Part 2B: Amplification with nested PCR	
Lab 8	Cloning and Sequencing of GAPDH Part 3: Purification and Ligation	
Lab 9	Cloning and Sequencing of GAPDH Part 4: Transformation	
Lab 10	Cloning and Sequencing of GAPDH Part 5: Plasmid purification (Miniprep)	
Lab 11	Animal cell culture transinfection	
Lab 12	Tour sequencing Lab (MOBIX)	
Note that this structure represents a plan and is subject to adjustment term by term. The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either		

type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING *including dates*	Weight
Case studies & Quizzes	10
Mid-term test	15
Team Project	15
Participation	05
Labs	25
Final examination (tests cumulative knowledge)	30
TOTAL	**100%**

Percentage grades will be converted to letter grades and grade points per the University calendar.

5. LEARNING OUTCOMES

1. Apply the molecular biology and biotechnology concepts to genome management in industry, environment, forensics, medicine, and diagnosis.
2. Explain the concept of sustainable energy and its application for the biofuel and in biorefinery especially in bioethanol and biodiesel.
3. Demonstrate enzymes concepts and kinetics in free and immobilized form in food, pharmaceutical, leather, pulp/paper and detergent industries.
4. Identify the different types of stem cells and their clinical application
5. Design bioprocess and apply biotechnology concepts to bioindustry and medicine

6. POLICIES

Anti-Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free of all discrimination. If there is a problem, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Officer or the Human Rights Consultant, as soon as possible.
http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.pdf

Academic Integrity

You are required to exhibit honestly and use ethical behaviour in all aspects if the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act of fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf .

The following illustrates only three forms of academic dishonesty:
1. Plagiarism. E.g. the submission of work that is not own or for which other credit has been obtained
2. Improper collaboration in group work
3. Copying or using unauthorized aids in tests and examinations.

Requests for Relief for Missed Academic Term Work (Assignments, Mid-Terms, etc.)

The McMaster Student Absence Form is an on-line self-reporting tool for Undergraduate Students to report absences for:

1) Relief for missed academic work worth less than 25% of the final grade resulting from medical or personal situations lasting up to three calendar days:

   - Students may submit a maximum of one academic work missed request per term. It is the responsibility of the student to follow up with instructors immediately (within the 3 day period

that is specified in the MSAF) regarding the nature of the accommodation. All work due in that time period however can be covered by one MSAF.

- MSAF cannot be used to meet religious obligation or celebration of an important religious holiday, for that has already been completed or attempted or to apply for relief for any final examination or its equivalent.

2) For medical or personal situations lasting more than three calendar days, and/or for missed academic work worth 25% or more of the final grade, and/or for any request for relief in a term where the MSAF has not been used previously in that term:

- Students must visit their Associate Dean's Office (Faculty Office) and provide supporting documentation.

E-Learning Policy

Consistent with the Bachelor of Technology's policy to utilize e-learning as a complement to traditional classroom instruction, students are expected to obtain appropriate passwords and accounts to access Avenue To Learn for this course. Materials will be posted by class for student download. It is expected that students will avail themselves of these materials prior to class. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail account, and program affiliation may become apparent to all other students in the course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about this disclosure please discuss this with the course instructor. Avenue can be accessed via http://avenue.mcmaster.ca.

Communications

It is the student's responsibility to:

- Maintain current contact information with the University, including address, phone numbers, and emergency contact information.
- Use the University provided e-mail address or maintain a valid forwarding e-mail address.
- Regularly check the official University communications channels. Official University communications are considered received if sent by postal mail, by fax, or by e-mail to the student's designated primary e-mail account via their @mcmaster.ca alias.
- Accept that forwarded e-mails may be lost and that e-mail is considered received if sent via the student's @mcmaster.ca alias.
- Check the McMaster/Avenue email and course websites on a regular basis during the term.

Turnitin (Optional)

This course will be using a web-based service (Turnitin.com) to reveal plagiarism. Students submit their assignment/work electronically to Turnitin.com where it is checked against the internet, published works and Turnitin's database for similar or identical work. If Turnitin finds similar or identical work that has not been properly cited, a report is sent to the instructor showing the student's work and the original source. The instructor reviews what Turnitin has found and then determines if he/she thinks there is a problem with the work. Students who do not wish to submit their work to Turnitin.com must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, etc.). To see the Turnitin.com Policy, please go to http://www.mcmaster.ca/academicintegrity/turnitin/students/

Protection of Privacy Act (FIPPA)

The Freedom of Information and Protection of Privacy Act (FIPPA) applies to universities. Instructors should take care to protect student names, student numbers, grades and all other personal information at all times. For example, the submission and return of assignments and posting of grades must be done in a manner that ensures confidentiality.
http://www.mcmaster.ca/univsec/fippa/fippa.cfm

Academic Accommodation of Students with Disabilities Policy

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information consult McMaster's policy for Academic Accommodation of Students with Disabilities
http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

Students must forward a copy of the SAS accommodation to the instructor of each course and to the Program Administrator of the B.Tech. Program immediately upon receipt. If a student with a disability chooses NOT to take advantage of a SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. http://sas.mcmaster.ca

Student Code of Conduct

The Student Code of Conduct (SCC) exists to promote the safety and security of all the students in the McMaster community and to encourage respect for others, their property and the laws of the land. McMaster University is a community which values mutual respect for the rights, responsibilities, dignity and well-being of others. The purpose of the Student Code of Conduct is to outline accepted standards of behavior that are harmonious with the goals and the well-being of the University community, and to define the procedures to be followed when students fail to meet the accepted standards of behavior. All students have the responsibility to familiarize themselves with the University regulations and the conduct expected of them while studying at McMaster University.
http://judicialaffairs.mcmaster.ca/pdf/SCC.pdf and http://www.mcmaster.ca/policy/Students-AcademicStudies/StudentCode.pdf