

Course Outline

1. COURSE INFORMATION			
Session Offered	WINTER 2012		
Course Name	Biotechnology I		
Course Code	BIOTECH 2B03		
Program Name	Biotechnology		
Calendar Description	<p>Basic elements of biotechnology. Proteins, enzymes, nucleic acids, DNA manipulation, cloning and recombinant technology, with applications in genetics, medicine and industry.</p> <p>Three lectures, one lab (three hours); one term</p>		
Instructor(s)	Dr. Faiez Alani	Phone: 905 525 9140 Ext. 20284 E-Mail: alanif@mcmaster.ca Office Hours & Location: Monday 2:30-3:30, Friday 9:30-10:30 or by appointment, office: ETB 208	
	Dr. Asif Mohammad (Lab Instructor)	amohamm@mcmaster.ca	
2. COURSE SPECIFICS			
Course Description	<p>Types of Biotechnology, Gene, genome and protein synthesis. Mutation, causes, types and mutation mechanisms, human genetic diseases. Recombinant DNA technology and DNA manipulation and genetic engineering. Types of vectors and cloning techniques, identification and cloning of genes. Protein as biotechnology products, production, purification and scale-up. Microbial biotechnology, microbial enzymes, bacterial transformation and cloning, industrial applications. Plant biotechnology, cloning in plant system and protoplast fusion and Applications. Aquatic biotechnology, medical, nonmedical and environmental applications.</p>		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	39
	L	Laboratory, workshop or fieldwork	36
Total Hours			75
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	978-0-321-49145-9	Introduction to Biotechnology, Second edition	William, J. Thieman and Michael A. Palladino. PEARSON, Benjamin Cummings
	Other Supplies	Source	
	Lectures	http://avenue.mcmaster.ca	
Prerequisite(s)	Prerequisite(s): BIOTECH 2CB3, 2M03		
Corequisite(s)	N/A		
Antirequisite(s)	BIOTECH 2BE3		
Course Specific Policies	The attendance of lectures is strongly encouraged and there are many non-announced quizzes. Students should attend all laboratory sessions and submit		

	<p>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 learning). There is no make-up policy in the term tests 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).</p> <p>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.</p> <p>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.</p>	
Departmental Policies	<p>Students must maintain a GPA of 3.5 on a 12 point scale 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.</p> <p>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.</p> <p>Announcements made in class or placed on Avenue are considered to have been communicated to all students including those individuals not in class. Instructors have the right to submit work to software to identify plagiarism.</p> <p>Instructors are permitted enforce a preference to shut off all electronic devices during class.</p>	
3. SUB TOPIC(S)		
Week 1	Introduction: Definition, types of biotechnology, biotechnology workforce	Chapter 1
Week 2	Gene and Genome: review of cell structure, chromosome structure, Genome, protein synthesis	Chapter 2
Week 3	Mutations: causes and consequences, types of mutations, mutations and human genetic diseases	Chapter 2
Week 4	Recombinant DNA Technology: Restriction enzymes, cloning and vectors	Chapter 3
Week 5	Identify and clone gene, applications of rDNA technology, genomics and bioinformatics	Chapter 3
Week 6	Term Test 1 Proteins as products: protein as biotechnology products, protein production.	Chapter 4
Week 7	Protein purification methods and scale-up, verification, proteomic.	Chapter 4
	Mid-term recess	

Week 8	Microbial biotechnology 1: Microbial enzymes, bacterial transformation, cloning and expression techniques.	Chapter 5
Week 9	Microbial biotechnology 2: Industrial applications, Food products and therapeutic proteins, vaccines, and Microbial diagnostic	Chapter 5
Week 10	Plant Biotechnology: Plant transgenesis, breeding, cloning and protoplast fusion, practical applications in the field.	Chapter 6
Week 11	Term Test 2 Aquatic Biotechnology 1: Aquaculture, molecular genetics of aquatic organisms.	Chapter 10
Week 12	Aquatic biotechnology 2: Medical, nonmedical and environmental applications.	Chapter 10
Week 13	Review	
Final Examination	Cumulative, Scheduled during the regular University Final Examination period established by the Registrar's Office.	

Proposed list of experiments

Lab 1	INTRODUCTION
Lab 2	SYNTHESIS OF ACETAMINOPHEN
Lab 3	ANALYSIS OF VITAMIN C
Lab 4	IDENTIFICATION OF GM FOODS BY PCR
Lab 5	ENZYMES IN TEXTILE PROCESSING
Lab 6	ENZYMES AND PROTEINS IN THE FOOD INDUSTRY
Lab 7	ANAEROBIC FERMENTATION OF YEAST1
Lab 8	ANAEROBIC FERMENTATION OF YEAST2
Lab 9	OIL DEGRADING PROPERTIES OF MARINE BACTERIA
Lab 10	DNA PROFILE ANALYSIS USING PCR AMPLIFICATION AND AGAROSE GEL ELECTROPHORESIS
Lab 11	BIODIESEL SYNTHESIS
Lab 12	Review
Lab schedule	Some of the labs will be performed on a rotating basis. The actual lab schedule will be provided by the instructor

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	Weight
Assignments/Quizzes	15
Term Test 1	15
Term Test 2	15
Labs	25
Final Examination	30
TOTAL	100%

Course results determined on a percentage scale will be converted to an official letter grade, as indicated in the Undergraduate Calendar. The results of all courses attempted will appear on your transcript as letter grades.

5. LEARNING OUTCOMES

1. Evaluate different types of mutation and their role in human genetic diseases
2. Identify the role of mutation and application in industry

3. Distinguish between recombinant DNA technology in different systems such as microbial and plant systems

4. Recognize protein as a biotechnology product and their production, purification and scale-up.

5. Apply biotechnology concepts and methods in medicine and industry

6. Perform safely the different recombinant DNA technology and biotechnology techniques in laboratory.

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/Anti-Discrimination%20policy.pdf>

Academic Integrity

Attention is drawn to the Statement on Academic Ethics and the Senate Resolutions on Academic Dishonesty as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and 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, specifically Appendix 3, located at: <http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>

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

The McMaster Student Absence Form is a self reporting tool for **Undergraduate Students** to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 5 days or exceed 1 request per term you **MUST** visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence.

<http://www.mcmaster.ca/msaf/>

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. 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 will be expected to submit their work electronically to Turnitin.com and in hard copy so that it can be checked for academic dishonesty. 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/>

Protection of Privacy Act (FIPPA)

The Freedom of Privacy 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/fippra/fippra.cfm>

Academic Accommodation of Students with Disabilities Policy

Student Accessibility Services (SAS) is committed to the continuous improvement of accessibility for students with disabilities. Students are encouraged to contact SAS as early as possible before each term starts to become familiar with the services offered and to confirm their accommodations.

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>