

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2017	
Course Name	Food Microbiology	
Course Code	BIOTECH 3FM3	
Date(s) and Time(s) of lectures	Monday, 9:30-11:30 AM Thursday, 9:30-10:30 AM	
Program Name	Biotechnology	
Calendar Description	An introduction to the microbiology of raw materials used in the manufacturing of food products. The course will review microbial growth and examine the types of microorganisms found in foods, the fermentation process in foods and food borne illnesses, strategies to prevent them growing and killing them.	
Instructor(s)	Dr. Faiez Alani (Lecture) Dr. Asif Mohammad (Lab)	E-Mail: alanif@mcmaster.ca Office Hours & Location: Office Hours & Location: Mon 1:30-2:30, Tue 1:30-2:30pm or by appointment, Office ETB/121A E-Mail: amohamm@mcmaster.ca Office Hours & Location: Thu 3:30-4:30pm or by appointment, Office ETB/209

2. COURSE SPECIFICS

Course Description	The course includes the study of micro-organisms important in food, such as bacteria, yeast, fungi, viruses and prions, the role of microbes in food spoilage, deterioration, food poisoning, and food-borne diseases. The course covers the effect of intrinsic and extrinsic conditions on growth of microbes and food quality along with the effect of these conditions on growth curve with the study of different physical, chemical and biological methods of food preservation. The study of food borne diseases and illness particularly food poisoning and illness caused by gram negative bacteria such as <i>Salmonella</i> , <i>Campylobacter</i> , <i>E. coli</i> and <i>Shigella</i> in addition to gram positive bacteria such as <i>Clostridium botulinum</i> , <i>Bacillus cereus</i> and <i>Listeria monocytogenes</i> . The study of mycotoxins produced by fungi, and neuro diseases caused by prions, such as mad cow diseases. The course will include food fermentation as a method for food preservation, methods and techniques used for the production of probiotics bacteria. The course will end with the industrial strategies for food safety, quality control and assurance in food industry in particular the HACCP, along with modern, automated and molecular biology techniques for detection and enumeration of microbes in food.		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	36
	L	Laboratory, workshop or fieldwork	18
	T	Tutorial	0
	DE	Distance education	n/a
	Total Hours		54
Resources	ISBN	Textbook Title & Edition	Author & Publisher

	ISBN: 9781555816360 or	Food Microbiology: An Introduction, 3 rd or 4 th edition	Thomas J. Montville, Karl R. Matthews and Kaliman E. Kniel, ASM Press
	Other Supplies	Source	
	Lectures Lab Manuals	http://avenue.mcmaster.ca http://avenue.mcmaster.ca	
Prerequisite(s)	BIOTECH 2CB3, 2MB3		
Corequisite(s)	Registration in level III or above of Biotechnology		
Antirequisite(s)	n/a		
Course Specific Policies	<p>The attendance of lectures is strongly encouraged and there are several unannounced quizzes throughout the term during the lecture period on all recently covered course material, including lectures, assignments, readings, fellow student presentations, etc. No make-up quizzes will be allowed without an acceptable explanation.</p> <p>A three-hour lab (split into two 1.5 hour sub sessions one on Monday and the other on Thursday) will be performed every other week in ETB/311B. Students are required to attend all laboratory sessions and to submit lab reports. It is responsibility of the student to download lab manuals posted on avenue. If you miss a lab and do not provide an MSAF for the missed lab (or other appropriate official documentation if you have already used your MSAF) you will still receive mark for any pre-lab work you had already submitted but you will receive a zero for that lab and any post-lab work that was to be handed in later. Absence from lab with no well documented excuse or failure to submit the report in time result with F grade in the lab.</p> <p>There will be one announced in-class test during the term. It will each cover material from the lectures, case studies and textbook course material up until the test. All tests must be written at the times announced. There is no make-up policy in the midterms for this course. If the student missed 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 must pass both components of the course –labs and lectures - to pass the course”.</p> <p>The final exam will be cumulative and will cover all course material, including the lectures, assignments, reading, any discussed topics, laboratory theory, material posted online and student presentations.</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. The communications via email strictly is by official McMaster</p>		

	University Account , no reply to the commercial emails and/or nick names.	
	Late submissions of lab reports will be penalized 10% per day within one week.	
Departmental Policies	<p>Students must maintain a GPA of 3.5/12 to continue in the program.</p> <p>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>Where group work is indicated in the course outline, such collaborative work is mandatory.</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 that are not in class.</p> <p>Instructor has the right to submit work to software to identify plagiarism.</p>	
3. SUB TOPIC(S)		
Week 1	Introduction: Micro-organisms in food, development in food microbiology	Chapter 1
Week 2	Factors influence microbial growth in foods: Food ecosystems, Extrinsic and intrinsic conditions. Case study 1	Chapter 2
Week 3	Spores: Spores in the food industry, importance of spore formers in public health, spore heat resistance. Quiz 1 Case study 2	Chapter 3
Week 4	Detection and enumeration of microbes in food: sample collection and processing, rapid and automated methods Case study 3	Chapter 4,5
Week 5	Indicator microorganisms and microbiological criteria: Establish criteria, sampling plans, indicator microorganisms. Quiz 2 Case study 4	Chapter 6
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Week 7	Foodborne pathogens: Gram-Negative Bacteria, enterohemorrhagic <i>E. coli</i> and <i>Salmonella</i> . Quiz 3 Case study 5	Chapter 12,14
Week 8	Foodborne pathogens: Gram-Positive Bacteria, <i>C. botulinum</i> and <i>Listeria monocytogenes</i> . Case study 6 Term Test	Chapter 10,13
Week 9	Foodborne pathogens: Molds; isolation, enumeration, mycotoxins. Prions and viruses: Food related viruses, bacteriophages in dairy industry, prion biology. Quiz 4 Case study 7	Chapter 22,24

Week 10	Control of microorganisms in food by antimicrobials: Factors affect antimicrobial activity, naturally occurring antimicrobials. Control of microorganisms in Food by biological methods: Biopreservation and probiotic bacteria. Case study 8	Chapter 25,26
Week 11	Control of microorganisms in Food by physical methods: Dehydration, cold storage, irradiation. Case study 9 Quiz 5	Chapter 27
Week 12	Food Safety & Quality control: Industrial strategies for safe food, good manufacturing practices and sanitation. Case study 10	Chapter 28
Week 13	Food nanotechnology: Type of nanoparticles, application of nanotechnology in control of microorganisms in food. Review	
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	Lab Safety and Food Microbiology Introduction Microscopic Examination of Yeast, Mold, and Bacteria	
Lab 2	Enumeration of Yeasts and Molds from Foods	
Lab 3	Cleaning and Sanitation	
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017		
Lab 4	Screening of <i>Listeria</i> Enrichments Using PCR-Based Testing	
Lab 5	Escherichia coli O157:H7 Enrichment and Immunomagnetic Separation	
Lab 6	Enumeration of spores from pepper	
Lab 7	Review and Final Lab Test	
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		15
Mid-term test		15
Team Project with presentation		10
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. Explain differences between the major groups of microorganisms in food and their role in foods and use		

these information in the diagnosis of food microorganisms

2. Differentiate between the intrinsic and extrinsic conditions and their influence on the growth of microorganisms in food and how they are applied to food processing

3. Understand key areas of microbiological food control ensuring food quality and safety

4. Design methods on controlling the transmission of food borne pathogens and know the industrial strategies for securing safe food in food industry particularly the quality control and assurance method, good manufacturing practices (GMPs), and the Hazard Analysis Critical Control Point (HACCP) system with respect to human safety and food quality

5. Applying the rapid and modern methods and techniques in the diagnosis of microbes in foods especially the application of molecular, biochemical and microbiological methods in the identification and diagnosis of food borne pathogens in short time (hours) as compared to the traditional methods (days)

6. Evaluate the food spoilage and their importance in food industry and to know the different strategies to minimize the contamination and control spoilage in raw material.

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 of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or 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>