

Course Outline

1. COURSE INFORMATION

Session Offered	Fall 2017		
Course Name	Computational Modeling of Biological Systems		
Course Code	BIOTECH 3CM3		
Date(s) and Time(s) of lectures	C01	Tu	08:30 10:20 ETB/234
	L01	Tu	16:30 18:20 ETB/B104
Program Name	Biotechnology		
Calendar Description	This course covers fundamental concepts of computational modeling and applying it to biological systems. Lab component will include programming language to explore/study biological systems.		
Instructor(s)	Dr. Nasim Muhammad	Phone: (905) 525-9140 x 24425 E-Mail: nasimm@mcmaster.ca Location & Office Hours: ETB 114, TBA	

2. COURSE SPECIFICS

Course Description	The purpose of the course is to develop student's skills in designing computational tools for solving and analyzing problems related to biological systems. The course is divided into two parts, (1) Java Programming (2) Numerical Analysis. The programming part of the course includes decisions making, loops, functions, strings, arrays, objects and classes. Several numerical techniques will be discussed to solve application problems that include finding root of nonlinear equations, curve fitting and numerical solution of ordinary differential equations.		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	24
	L	Laboratory, workshop or fieldwork	24
	T	Tutorial	0
	DE	Distance education	0
	Total Hours		48
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	9780134611037	Introduction to Java Programming, Brief Version (11th Edition)	Y. Daniel Liang, Pearson
	Other Supplies	Source	
	http://avenue.mcmaster.ca		
Prerequisite(s)	ENG TECH 1CP3, 2MA3; and registration in Level IV or above of Biotechnology program		
Corequisite(s)	None		
Antirequisite(s)	None		
Course Specific Policies	<ul style="list-style-type: none"> Students must attend the lab as specified by the instructor in order to receive a grade for the lab assignment. Assignments and lab reports will be submitted through Avenue as per posted due dates. A submission after the deadline or by e-mail will not be 		

	<p>considered for marking or review.</p> <ul style="list-style-type: none"> All tests/Labs/Assignments marks will be posted on Avenue. It is your responsibility to report any discrepancies to your instructor before the last day of classes. No errors will be corrected unless reported by this time. McMaster standard calculator (CASIO FX991MS) is the only calculator allowed during Test and Exam. The use of other Casio or other brand calculator is strictly prohibited.
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 (Sep 5 – 8)	Introduction to Java, Elementary Programming
Week 2 (Sep 11 – 15)	Decision and Loop structures
Week 3 (Sep 18 – 22)	Methods
Week 4 (Sep 25 – 29)	Nonlinear equations
Week 5 (Oct 2 – 6)	Arrays
Mid-term Recess: Monday, October 9 to Sunday, October 15, 2017	
Week 6 (Oct 16 – 20)	File I/O, Exception Handling
Week 7 (Oct 23 – 27)	Midterm Test
Week 8 (Oct 30 – Nov 3)	String Manipulation
Week 9 (Nov 6 – 10)	Classes and Objects
Week 10 (Nov 13 – 17)	Curve fitting
Week 11 (Nov 20 – 24)	Ordinary differential equation
Week 12 (Nov 27 – Dec 01)	System of Ordinary differential equations

Week 13 (Dec 4 – 6)	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	Introduction to Java, Elementary Programming	
Lab 2	Decision and Loop structures	
Lab 3	Methods	
Lab 4	Nonlinear equations	
Lab 5	Arrays	
Lab 6	File I/O, Exception Handling, String Manipulation	
Lab 7	Classes and Objects	
Lab 8	Curve fitting	
Lab 9	ODE	
Lab 10	System of ODE	
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
Assignments /Labs		20
Mid-term test		35
Final examination (tests cumulative knowledge)		45
TOTAL		100%
Percentage grades will be converted to letter grades and grade points per the University calendar.		
5. LEARNING OUTCOMES		
1. Apply fundamentals of Java programming such as variables, decisions structure and loops for solving application problems.		
2. Construct and use java methods for solving application problems.		
3. Declare, initialize, and manipulate one-dimensional and two-dimensional arrays.		
4. Solve for the zero of a non-linear algebraic function using numerical methods. Develop Java routines for these methods.		
5. Identify classes, objects, members of a class and the relationships among them needed for a specific problem.		
6. Able to fit a curve for given data set. Use Java code to determine these curves and evaluate values between the given data points.		
7. Compute the solution for a first-order ordinary differential equation with initial condition related to biological systems using numerical techniques.		
8. Obtain solutions to simultaneous sets of first-order ordinary differential equations related to biological systems using numerical techniques.		
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>