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	Winter 2019	
Course Name	CIM & Flexible Manufacturing	
Course Code	MANTECH 4FM3	
Date(s) and Time(s) of lectures	Mondays from 6:30 pm – 9:30 pm January 7, 2019 – April 8, 2019	
Program Name	Manufacturing Engineering Technology	
Calendar Description	Facility layout; cellular manufacturing; flexible manufacturing systems; programmable logic controllers (PLCs); computer-aided process control; quality control and inspection principles; inspection technologies; coordinate measuring machines (CMM.)	
Instructor(s)	Dr. Timber Yuen, P.Eng.	E-Mail: timber@mcmaster.ca Office: MARC 270

2. COURSE SPECIFICS

Course Description

Instruction Type

Code	Type	Hours per term
C	Classroom instruction	30
L	Laboratory, workshop or fieldwork	6
T	Tutorial	
DE	Distance education	
	Total Hours	36

Resources

ISBN	Textbook Title & Edition	Author & Publisher
978-0133499612	Automation, Production Systems and Computer-Integrated Manufacturing, 4th Edition,	Groover, M.P, Prentice Hall

Other Supplies	Source

Prerequisite(s)	MANTECH 3MF3 and Registered in Manufacturing Engineering Technology
Corequisite(s)	N/A
Antirequisite(s)	MANTECH 3FM3
Course Specific Policies	All assignments and lab reports must be handed in before or on the due date. No late submissions will be accepted.
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	Introduction to Computer Integrated Manufacturing (CIM) • Automation in production systems • Basic elements of an automated system • Production Yield, Uptime and OEE	
Week 2	Industrial Control Systems • Continuous versus discrete control • Computer process control • On/Off & PID Control – Advantages and Disadvantages • Introduction to Digital Signal Processing	
Week 3	Process Control Hardware • Sensor & Actuators • Temperature Control Hardware • PID Controller for Temperature Control • Demo: On/Off Controller with Fan	
Week 4	Lab #1: On-Off Control and PID Control Lab	
Week 5	Term Test #1	
Week 6	Discrete Control Using PLC Ladder Logic • Discrete process control • Ladder Logic Diagrams • AND, OR, NOR Logic Gates • ON/OFF Sensors and Actuators • Relays • Programmable Logic Controllers	
Mid-term Recess: Monday, February 18 to Sunday, February 24, 2019		
Week 8	Timing Diagrams for PLC • Counters & Timers • Use of Timing Diagram for Trouble Shooting	
Week 9	Lab #2: Water Level Control PLC Ladder Logic Simulation Lab	
Week 10	Term Test #2	
Week 11	Inspection Principles • Inspection fundamentals • Sampling versus 100% inspection • Types of Inspections • Inspection Accuracy: Type 1 & Type 2 Errors • Inspection versus Process Monitoring	
Week 12	Machine Vision • Machine Vision and Applications • Pixel Intensity & Lighting • Image processing techniques • Edge Detection • Pixel Calibration • Convolution Mask	

Week 13	CMM, Length Gauge, Touch Probe Gauging Equipment • Inspection metrology • Contact versus noncontact inspection techniques • Conventional measuring and gauging techniques • Coordinate Measuring Machines (CMMs) • Vibration Isolation to Improve Inspection Accuracy	

Classes end: Tuesday, April 9, 2019
Final examination period: Thursday, April 11 to Monday, April 29, 2019
All examinations MUST be written during the scheduled examination period.

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 (3 % x 3)	9%
Term Test #1 (February 4, 2019)	25%
Term Test #2 (March 11, 2019)	25%
Labs	4%
Final examination (tests cumulative knowledge)	37%
TOTAL	**100%**

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

5. LEARNING OUTCOMES

1. Perform analysis on force vectors in 2D and 3D
2. Evaluate performance of 2D and 3D trusses under static loading conditions
3. Evaluate performance of mass elements in various loading conditions
4. Evaluate performance of mass elements in sliding motion with friction
5. Predict the kinematic behaviour of objects in collision
6. Predict the kinematic behaviour of mass and spring in free vibrations.

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.

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://studentconduct.mcmaster.ca/student_code_of_conduct.html