

Course Outline

1. COURSE INFORMATION			
Session Offered	Fall 2019-20		
Course Name	Kinetics and Dynamics		
Course Code	MECH ENG 2Q04		
Program Name	Bachelor of Mechanical Engineering Bachelor of Mechanical Engineering Management		
Calendar Description	Equilibrium of a particle and rigid bodies; centroids, centres of gravity; second moment of area, moment of inertia; cable static analysis; friction. Planar kinematics of particles and rigid bodies; planar kinetics of particles and rigid bodies; work and energy, impulse, and momentum of particles and rigid bodies; mass, spring and damper systems.		
Instructor	Sumanth Shankar	Phone/Text: 905 512-1324 E-Mail: shankar@mcmaster.ca Location: JHE 142 or JHE 101	
Lectures	Tuesday, Wednesday and Friday	12:30 to 13:20 hours @ MDCL/1102	
Tutorials	<u>Section T03</u> Tuesday → 16:30 to 18:20 hours <u>Section T01</u> Wednesday → 13:30 to 15:20 hours <u>Section T04</u> Thursday → 16:30 to 18:20 hours <u>Section T02</u> Monday → 09:30 to 11:20 hours	PC/335 First Class: Tuesday September 10, 2019 BSB/119 First Class: Wednesday September 11, 2018 PC/335 First Class: Thursday September 12, 2018 PC/335 First Class: Monday September 16, 2018	
Teaching Assistants (TA)	Uttkarsh Patel Yue Wang Marcin Magolon Ali Safdel Abhishek Sarmah	patelu18@mcmaster.ca wangy674@mcmaster.ca maqoloms@mcmaster.ca safdela@mcmaster.ca sarmaha@mcmaster.ca	Office Hours Upon email request
2. COURSE SPECIFICS			
Course Description	Equilibrium of a particle in two- and three-dimensions; equilibrium of rigid bodies in two- and three-dimensions; centroids, centres of gravity; second moment of area, moment of inertia; cable static analysis; friction. Planar kinematics of particles and rigid bodies; planar kinetics of particles and rigid bodies; work and energy, impulse, and momentum of particles and rigid bodies; introduction to mechanical vibration systems and performance measure of the system.		
Instruction Type	Code	Type	Hours per term
	C	Classroom instruction	36
	L	Laboratory, workshop or fieldwork	
	T	Tutorial	24
	DE	Distance education	
	Total Hours		60
Resources	ISBN	Textbook Title & Edition	Author & Publisher
	ISBN-10: 0134116992	Engineering Mechanics: Dynamics Plus	R.C. Hibbeler ©2016 Prentice Hall

	ISBN-13: 9780134116990	MasteringEngineering with Pearson eText -- Access Card Package, 14/e	
	Other Supplies	Source	
Prerequisite(s)	Registration in Level II of any Mechanical Engineering program		
Corequisite(s)			
Antirequisite(s)	CIVENG 2Q03, 2Q04, ENGINEER 2Q04, MECHENG 2QA4, 2QR4		
Course Specific Policies	<p>This course will be using a range of software. 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 and Avenue</p> <p>All assignments must be handed in class and on schedule. All assignments must be hand written.</p>		
Departmental Policies	<p>Students must maintain a GPA of 4.0 on a 12 point scale to continue in the program.</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 not in class.</p>		
3. SUB TOPIC(S)			
1	Rectilinear kinematics of a particle, distance, velocity and acceleration time graphs, curvilinear kinematics		
2	Motion of a projectile, N & T, polar and cylindrical coordinate system.		
3	Absolute motion analysis of two particles, Newton's law of motion.		
4	Normal and tangential acceleration and force, cylindrical coordinate system.		
5	Work and energy, friction, power and efficiency.		
6	Conservative force, elastic potential energy.		
7	Linear and angular impulse and momentum.		
8	Rigid body motion.		
9	Relative motion analysis.		
10	Instantaneous center of zero velocity, rolling motion and bodies in contact.		
11	Mass moment of inertia and planar kinetic equations of motion.		

12	Final Exam	
<p>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.</p>		
4. ASSESSMENT OF LEARNING		Weight
In-Class Quizzes		20%
Mid-Term Test (Friday, October 25, 2019 @ 5:30 to 8:00 pm at a TBA venue)		40%
Project		
Labs		
Participation		
Final Examination		40%
TOTAL		100%
<p><u>Homework Assignments:</u> Total of Eleven (11) homework in the course. The homework assignments will be given each and every week through the course module in the avenue to learn forum. The homework assignments will not be graded but students are encouraged to try solving the problems posed in these assignments so as to improve their understanding and problem solving skills in the course material. The solutions to the homework assignments will be posted a week later, each time.</p> <p><u>Quizzes:</u> Total of Ten (10) Quizzes in the course. The best eight (8) quiz scores will form 20% of the final total. There will a quiz for 15 minutes at the beginning of all tutorial class beginning in the week of September 10, 2018. The quiz will be a closed book exam and will test the concepts learnt in the previous week of lectures and homework. Details of quiz schedule will be posted in the course module in Avenue to Learn.</p> <p><u>Mid-Term and Final Examinations:</u> The examinations will be for a 2½ hour duration. The schedule and syllabus will be posted in Avenue well ahead of time.</p> <p><u>Grading:</u> 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.</p>		
5. LEARNING OUTCOMES		
(1.1) Competence in Mathematics		
(1.2) Competence in Natural Science (Physics)		
Ability to identify reasonable assumptions that could or should be made before a solution path is proposed		
(2.1) (2.2) Ability to Identify a range of suitable engineering fundamentals that would be potentially useful for analyzing a technical problem		
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

You are expected to exhibit honesty 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 types of academic dishonesty please refer to the Academic Integrity Policy, located at www.mcmaster.ca/academicintegrity. The following illustrates only three forms of academic dishonesty: • Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained. • Improper collaboration in group work. • Copying or using unauthorized aids in tests and examinations.

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

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar "Requests for Relief for Missed Academic Term Work".

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.

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/fippa/fippa.cfm>

Academic Accommodation of Students with Disabilities Policy

The Centre for Student Development is committed to the continuous improvement of accessibility for students with disabilities. Students are encouraged to contact CSD 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 CSD 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 CSD accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. <http://csd.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>