

Course Outline

1. COURSE INFORMATION			
Session Offered	Fall 2020-21		
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: Virtual classroom/meeting space	
Lectures	Tuesday, Wednesday and Friday	12:30 to 13:20 hours @ virtual classroom	
Tutorials	<u>Section T01</u> Thursday → 12:30 to 14:20 hours <u>Section T02</u> Thursday → 16:30 to 18:20 hours <u>Section T03</u> Wednesday → 14:30 to 16:20 hours <u>Section T04</u> Thursday → 09:30 to 11:20 hours	Virtual Classroom First Class: Tuesday September 17, 2020 Virtual Classroom First Class: Wednesday September 17, 2020 Virtual Classroom First Class: Thursday September 16, 2020 Virtual Classroom First Class: Monday September 17, 2020	
Teaching Assistants (TA)	Panashe Mudzi Samuel Heavenfich Ziyu Zhao Chevulana Daman	mudzip@mcmaster.ca heavenrs@mcmaster.ca zhaoz142@mcmaster.ca damanc@mcmaster.ca	Office Hours TBA
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	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		
Departmental Policies	Students must maintain a GPA of 4.0 on a 12 point scale to continue in the program. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those not in class.		
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		
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
In-Class Quizzes <ul style="list-style-type: none"> Each Tutorial will be followed by an online individual quiz covering the respective syllabus in each tutorial. Each quiz will be half (1/2) hour in duration and the student may choose to take the quiz at any time convenient during the respective week of quiz offering. 	20%	
Mid-Term Test <ul style="list-style-type: none"> One (1) midterm examination will be taking place on October 26, 2020 between 1800 and 2030 hours (6 to 8:30 pm) 	40%	
Final Examination <ul style="list-style-type: none"> To Be Announced 	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. The students may approach one of the TA-s for any assistance with the homework assignments.</p> <p><u>Quizzes:</u> Quiz series starts from the week of September 21, 2020. A Maximum of Ten (10) Quizzes in the course. The two (2) lowest quiz scores will be dropped in evaluating course grade and the remaining will form 20% of the final total. 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		
Equity, Diversity, and Inclusion		

Every registered student belongs in this course. Diversity of backgrounds and experiences is expected and welcome. You can expect your Instructor to be respectful of this diversity in all aspects of the course, and the same is expected of you.

The Department of Mechanical Engineering is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Department, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the Equity and Inclusion Office.

Physical and Mental Health

For a list of McMaster University's resources, please refer to the Student Wellness Centre.

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.

Courses with an On-Line Element

McMaster is committed to an inclusive and respectful community. These principles and expectations extend to online activities including electronic chat groups, video calls and other learning platforms.

Some courses may use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, 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 a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

Online Proctoring

Online proctoring software maybe used for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

Conduct Expectations

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [*Code of Student Rights & Responsibilities*](#) (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or

interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of A2L, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

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>

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>

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students should submit their request to their Faculty Office normally within 10 working days of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, including lectures by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

EXTREME CIRCUMSTANCES

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.