Instructor:
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Office Hours: Wed., Fri., 4:30-5:30pm

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Office Hours: By appointment

Lectures: 2 hours/week: Wed., Fri. 3:30-4:20pm ITB 137
Tutorial 01: 2 hours/week: Thur. 2:30-4:20pm BSB 137
Tutorial 02: 2 hours/week: Mon. 8:30-10:20pm BSB 137

Website: Avenue to Learn (http://avenue.mcmaster.ca)

It is the responsibility of the students to check Avenue regularly

Course Overview:
This 3-credit course emphasizes in the: kinematics and dynamics of particles and rigid bodies; motion with respect to a rotating frame of reference; work, energy and momentum principles; introduction to vibrations.

Prerequisites:
Canadian Engineering Accreditation Board (CEAB) Graduate Attributes & Indicators:

1. A knowledge base for engineering

“Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.”

Indicators to be measured:
CEAB 1.1  Competence in Mathematics
CEAB 1.3  Competence in Engineering Fundamentals

3. Investigation

“An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.”

Indicator to be measured:
CEAB 3.2  Capable of selecting appropriate model and methods and identify assumptions and constraints.

Learning Outcomes:

1. Ability to describe the position, velocity, and acceleration (collectively referred to as kinematics) of a particle, a system of particles, or a rigid body, using vectors in various coordinate systems (e.g., Cartesian, cylindrical polar, Frenet–Serret, etc.) [CEAB 1.1]
2. Ability to identify and mathematically describe kinematic constraints [CEAB 3.2]
3. Ability to identify and describe common forces acting on a particle, system of particles, or rigid body (e.g., friction, spring, gravity, normal) in vector form and to draw free-body diagrams [CEAB 1.3]
4. Ability to use balance laws (aka, Newton’s Laws, Euler’s Laws) to set up the equations that describe the motion (the kinetics) of a particle, a system of particles, or a rigid body [CEAB 1.3]
5. Ability to identify when momentum or energy is conserved [CEAB 3.2]
6. Ability to setup and solve practical dynamics problems either by solution of the equations of motion or using conservation laws [CEAB 1.1, 1.3, and 3.2]
## Course Calendar:
This schedule is provided as a rough guide and may slightly change depending upon the pace of lectures.

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture Dates</th>
<th>Lecture Topics</th>
<th>Chapters in Textbooks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 8,10</td>
<td>Course Introduction, Kinematics of a particle</td>
<td>12 [H], 11 [B], 2 [M]</td>
</tr>
<tr>
<td>2</td>
<td>Jan 15,17</td>
<td>Kinematics of a particle (cont’d)</td>
<td>12 [H], 11 [B], 2 [M]</td>
</tr>
<tr>
<td>3</td>
<td>Jan 22,24</td>
<td>Kinetics of a particle: force and acceleration</td>
<td>13 [H], 12 [B], 3 [M]</td>
</tr>
<tr>
<td>4</td>
<td>Jan 29,31</td>
<td>Quiz 1, Kinetics of a particle: work and energy</td>
<td>14 [H], 13 [B], 3 [M]</td>
</tr>
<tr>
<td>5</td>
<td>Feb 5,7</td>
<td>Kinetics of a particle: work and energy (cont'd)</td>
<td>14 [H], 13 [B], 3 [M]</td>
</tr>
<tr>
<td>6</td>
<td>Feb 12,14</td>
<td>Kinetics of a particle: impulse and momentum</td>
<td>15 [H], 13 [B], 3 [M]</td>
</tr>
<tr>
<td>-</td>
<td>Feb 19,21</td>
<td>No Classes or Tutorials</td>
<td></td>
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<tr>
<td>7</td>
<td>Feb 26,28</td>
<td>Quiz 2, Planar kinematics of a rigid body</td>
<td>16 [H], 15 [B], 5 [M]</td>
</tr>
<tr>
<td>8</td>
<td>Mar 4,6</td>
<td>Planar kinematics of a rigid body (cont’d)</td>
<td>16 [H], 15 [B], 5 [M]</td>
</tr>
<tr>
<td>9</td>
<td>Mar 11,13</td>
<td>Planar kinetics of a rigid body: force and acceleration</td>
<td>17 [H], 16 [B], 6[M]</td>
</tr>
<tr>
<td>10</td>
<td>Mar 18,20</td>
<td>Quiz 3, Planar kinetics of a rigid body: force and acceleration (cont’d)</td>
<td>17 [H], 16 [B], 6[M]</td>
</tr>
<tr>
<td>11</td>
<td>Mar 25,27</td>
<td>Planar kinetics of a rigid body: work and energy</td>
<td>18 [H], 16 [B], 6[M]</td>
</tr>
<tr>
<td>12</td>
<td>Apr 1,3</td>
<td>Vibrations</td>
<td>22 [H], 19 [B], 8[M]</td>
</tr>
</tbody>
</table>

Required Textbook:

Alternative Textbooks:

Note: Material presented in class may not be available in the textbooks listed above, and it may not be made available on Avenue.

Evaluation:
- Assignments 20%
- Quizzes 40% (Best 2 out of 3)
- Final Exam 40%

Note: Students must pass the final examination to pass this course. Students who fail the final examination will be assigned the final examination mark as their course grade.
Assignments:

- Due dates will be indicated on the assignment sheets. **Late assignments will not be accepted.** If a student has submitted an MSAF for a homework assignment, and it is been accepted, the percentage value of the missed assignment will be added to the weight of the final exam.

- Assignments are to be submitted to the designated drop box for the course. **Electronic submissions will not be accepted.** Assignment solutions will be made available on the course website.

- All pages should be stapled together. **Your name, student ID number, and Tutorial Session Number (1 or 2) should appear on the first page of the solution.** Marked assignments will be returned in your assigned tutorial section.

- **Assignments must be done in pencil on engineering or grid paper.** Minimum standards of neatness will be expected for all assignments. These standards include neat, legible printing, use of a straight edge for straight lines, and use of an eraser to correct mistakes. Assignments will be returned UNMARKED if these standards are not met.

- Assignments are to be individual effort. **Excessive collaboration** on an assignment may constitute a violation of the McMaster Academic Integrity Policy (Appendix 3).

- **Definition of excessive collaboration:**
  - Discussing an assignment in significant detail with peers or splitting up work.
  - Using a classmate’s assignment as the basis or as a reference for your own, or allowing someone else to do this with your assignment.
  - Sharing computer code, spreadsheet file, etc., to be submitted as part of an assignment.

- **How to avoid excessive collaboration:**
  - Do not discuss assignment solutions with classmates in step-by-step detail.
  - Do not show or give your assignment solution to another student.
  - Write up your solution separately from your classmates.
  - If you work with someone else or receive assistance, please indicate this and the name(s) of the person(s) involved on your assignment.

**Note:** Unclaimed assignments will be kept for a period of one (1) month past the final exam date after which they will be destroyed by secure shredding.
Quizzes:

- There will be three Quizzes. Each Quiz will be 45 min long, will be held during the lecture period, and counts for 20%.
- It is not required to write all three Quizzes. The two best Quizzes out of the three will be counted.
- It is your responsibility to make yourself available during the Quizzes. There will be no alternative times to write a Quiz. The Quizzes are not MSAF-able (please refer to http://mcmaster.ca/msaf/ for MSAF policies).
- If a Quiz is missed due to illness, accommodation may be requested from the Associate Dean’s office. If such a request is approved, the weight of the missed Quiz will be added to the final exam.
- One (1) 8.5 x 11 in. (double-sided) “formula sheet” and Standard Calculator, such as Casio fx-991 MS or MS Plus or comparable, will be permitted.

### Dates of Quizzes:

<table>
<thead>
<tr>
<th>Quiz</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>January 29, 2020</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>February 26, 2020</td>
</tr>
<tr>
<td>Quiz 3</td>
<td>March 18, 2020</td>
</tr>
</tbody>
</table>

Final Exam:

- The final examination will be scheduled by the Registrar.
- One (1) 8.5 x 11 in. (double-sided) “formula sheet” and Standard Calculator, such as Casio fx-991 MS or MS Plus or comparable, will be permitted.
McMaster University Policies

ACADEMIC INTEGRITY

You are required 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 result 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 own or for which other credit has been obtained
• Improper collaboration in group work
• Copying or using unauthorized aids in tests and examinations

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 the posting of grades must be done in a manner that ensures confidentiality - see http://www.mcmaster.ca/univsec/fippa/fippa.cfm.

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES POLICY

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) https://sas.mcmaster.ca/ to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s https://www.mcmaster.ca/policy/StudentsAcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf.
ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDEGENOUS 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 requiring a RISO accommodation 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.

REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK – MSAF (ASSIGNMENTS, MID-TERMS, ETC)

The McMaster Student Absence Form is a self reporting tool for Undergraduate Students to report absences that last up to 5 days and provides the ability to request accommodation for any missed academic work. Please note, this tool cannot be used during any final examination period.

You may submit a maximum of 1 Academic Work Missed requests per term. It is YOUR responsibility to follow up with your Instructor immediately regarding the nature of the accommodation.

If you are absent more than 5 days or exceed 1 request per term you MUST visit your Associate Dean's Office (Faculty Office). You may be required to provide supporting documentation.

This form should be filled out immediately when you are about to return to class after your absence. http://www.mcmaster.ca/msaf/.

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. https://www.mcmaster.ca/policy/General/HR/Discrimination_and_Harassment.pdf.

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.