

## Course Outline

1. COURSE INFORMATION			
Session Offered	Fall 2020		
Course Name	Physics		
Course Code	ENGTECH1PH3		
Date(s) and Time(s) of lectures	C01: Tuesday 8:30-10:30 & Thursday 8:30-10:30 (Virtual Classroom) C02: Tuesday 10:30-12:30 & Thursday 12:30-14:30 (Virtual Classroom) C04: Wednesday 8:30-10:30 & Friday 9:30-11:30 (Virtual Classroom)		
Program Name	Automotive and Vehicle Technology/ Biotechnology/ Process Automation Technology		
Calendar Description	Sound, light, kinematics, forces, work, energy, fluid and thermal physics.		
Instructor(s)	Dr. Reza Ushaksaraei, Ph.D., P.Eng. Nicoleta Ladanyi Mandeep Saini Daisy Korah	E-Mail: <a href="mailto:ushakr@mcmaster.ca">ushakr@mcmaster.ca</a> E-Mail: <a href="mailto:ladanyi@mcmaster.ca">ladanyi@mcmaster.ca</a> E-Mail: <a href="mailto:sainima@mcmaster.ca">sainima@mcmaster.ca</a> E-Mail: <a href="mailto:korahd@mcmaster.ca">korahd@mcmaster.ca</a>	
2. COURSE SPECIFICS			
Course Description	Kinematics in one and two dimensions, forces and Newton's laws of motion, dynamics of uniform circular motion, work and energy, impulse, momentum, simple harmonic motion and elasticity, fluids, temperature and heat, heat transfer, sound, reflection and refraction of light, interference and the wave nature of light.		
Instruction Type	<b>Code</b>	<b>Type</b>	<b>Hours per term</b>
	C	Classroom instruction (Virtual Classroom)	52
	L	Laboratory, workshop or fieldwork	12
	T	Tutorial	
	DE	Distance education	
	<b>Total Hours</b>		64
Resources	<b>ISBN</b>	<b>Textbook Title &amp; Edition</b>	<b>Author &amp; Publisher</b>
	9 <sup>th</sup> Ed: 978-0-470-87952-8 8 <sup>th</sup> Ed: 978-0-470-22355-0 7 <sup>th</sup> Ed: 978-0-471-66315-7	Physics, 11 <sup>th</sup> , 10 <sup>th</sup> , 9 <sup>th</sup> , 8 <sup>th</sup> or 7 <sup>th</sup> Editions	Cutnell & Johnson Wiley Publication
		Physics Lab Manual <b>(will be posted on Avenue to learn)</b>	McMaster University
	<b>Other Supplies</b>	<b>Source</b>	
Prerequisite(s)	Registration in B.Tech. I.		
Corequisite(s)	None		
Antirequisite(s)	None		
Course Specific Policies	<ul style="list-style-type: none"> <li>• Students must pass both Theory and Lab components (50% minimum) for passing this course.</li> <li>• The course will be delivered as Virtual Classroom based on the regular weekly schedule. Instructions for joining the virtual lectures will be posted on Avenue to Learn.</li> </ul>		

	<ul style="list-style-type: none"> <li>• <b>Learning materials will be available to you on Avenue, as usual.</b></li> <li>• <b>Virtual office hours will be announced on Avenue.</b></li> <li>• <b>Instructor meetings will be conducted remotely using Zoom. The instructor can also be contacted via email, as usual.</b></li> <li>• <b>The Quizzes, Term Tests and the Final Exam will be take-home exams posted on Avenue. You will upload your answers on Avenue. The details will be posted on Avenue ahead of time.</b></li> <li>• <b>Due dates for course work will be posted on Avenue ahead of time.</b></li> </ul>	
<p><b>Departmental Policies</b></p>	<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 [in-person] 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>	
<p><b>3. SUB TOPIC(S)</b></p>		
<p>Week 1</p>	<p><b>Introduction to mathematical concepts</b>                  Units and dimensional analysis.                  Mathematical concepts.                  Vectors and scalars. Vector addition and subtraction.</p>	<p>Chapter 1</p>
<p>Week 2</p>	<p><b>Kinematics in one dimension</b>                  Displacement, speed and velocity, acceleration.  <b>Kinematics in two dimensions</b>                  Projective motion.</p>	<p>Chapter 2                  Chapter 3</p>
<p>Week 3</p>	<p><u>Quiz#1</u>  <b>Force and Newton’s laws of motion</b>                  Force and mass. Newton’s laws of motion. Gravitational force.                  Normal force. Static and dynamic friction forces. Tension force.                  Forces in equilibrium and unbalanced forces.</p>	<p>Chapter 4</p>
<p>Week 4</p>	<p><u>Quiz#2</u>  <b>Dynamics of uniform circular motion</b>                  Dynamics of uniform circular motion (horizontal and vertical).                  Centripetal acceleration. Banked curves.                  Satellites in circular orbits. Weightlessness and artificial gravity.</p>	<p>Chapter 5</p>
<p>Week 5</p>	<p><b>Work and energy</b>                  Work. Kinetic and potential energy. Conservative and nonconservative forces. Conservation of mechanical energy.                  Work –energy theorem.</p>	<p>Chapter 6</p>

Mid-term Recess: Monday, October 12 to Sunday, October 18

Week 6	<u>Term test#1</u> <b>Impulse and momentum</b> Impulse and momentum. Conservation of linear momentum.	<u>Chapters#1-5</u>  Chapter 7
Week 7	<u>Quiz #3</u> <b>Simple Harmonic Motion and Elasticity</b> Hooke's Law, Simple harmonic motion, Elastic deformation(Young's modulus)	Chapter 10
Week 8	<u>Quiz#4</u> <b>Fluids</b> Fluid statics. Mass density and pressure. Pascal's principle. Archimede's principle. Fluids dynamics. Equation of continuity. Bernoulli's principle. Viscous flow.	Chapter 11
Week 9	<b>Temperature and heat</b> Temperature. Linear and volume thermal expansion. Heat and internal energy. Specific and latent heat. Humidity.	Chapter 12
Week 10	<u>Term test#2</u> <b>Transfer of heat</b> Convection, Conduction and radiation.	<u>Chapters 6,7,10,11</u>  Chapter 13
Week 11	<u>Quiz#5</u> <b>Waves and sound</b> Nature of waves. Transverse, longitudinal, periodic waves. Nature of sound. Speed, level and intensity. Doppler effect.	Chapter 16
Week 12	<b>Reflection of light: Mirrors</b> Reflection of light. Spherical mirrors. Mirror equation. <b>Refraction of light: Lenses and optical instruments</b> Refraction of light. Snell's law. Total internal reflection. Lenses. Lens equation. <b>Interference and the wave nature of light.</b> Interference of light.	Chapter 25  Chapter 26  Chapter 27
Week 13	<i>Review.</i>	

Classes end: Wednesday, December 9

Final examination period: Thursday, December 10 to Wednesday, December 23

All examinations MUST be written during the scheduled examination period.

**List of experiments { labs are conducted Every Other Week }**

Lab 1	Vectors
Lab 2	Force and Acceleration
Lab 3	Simple Pendulum
Lab 4	Archimede's Principle
Lab 5	Latent Heat
Lab 6	Ray Optics

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
Quizzes (TBA)	15
Term-term test 1 (TBA)	20
Term-term test 2 (TBA)	20
Labs	15
Final examination (tests cumulative knowledge) (TBA)	30
<b>TOTAL</b>	<b>100%</b>

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

#### 5. LEARNING OUTCOMES

1. Apply kinematic principles in one and two dimensions using equations that involve position, velocity and acceleration, and time.
2. Use Newton’s laws to study the static equilibrium, the dynamic of a single particle, and systems of two or more objects, perform calculations related to static and kinematic force and friction.
3. Identify work, energy, impulse and momentum, solve problems that call for application both of conservation of energy and Newton’s laws.
4. Define density and pressure, explain Pascal and Archimede’s principles, apply them in the study of fluids, solve applications that involve buoyancy, and apply fluid flow continuity and Bernoulli’s equation to fluids in motion.
5. Define appropriate terms and apply formulas related to temperature, thermal expansion, specific and latent heat and heat transfer.
6. Describe the nature of waves and sound and complete related calculations using appropriate formulas for different types of wave propagation. Recognize the wave nature of light, perform calculations on the reflection, refraction and interference of light, understand the principles used to build mirrors and lenses used in technology applications and solve problems related to constructive or destructive interference.

#### 6. COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

##### 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](http://www.mcmaster.ca/policy/General/HR/Discrimination_Harassment_Sexual_Harassment-Prevention&Response.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. It is your responsibility to understand what constitutes academic dishonesty.

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. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty: 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.

### **AUTHENTICITY / PLAGIARISM DETECTION**

Some courses may use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### **COURSES WITH AN ON-LINE ELEMENT**

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**

Some courses may use online proctoring software 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.

### **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.

### **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 Avenue 2 Learn, 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.

### **ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES**

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) at 905-525-9140 ext. 28652 or [sas@mcmaster.ca](mailto:sas@mcmaster.ca) to make arrangements with a Program Coordinator. For further information, consult McMaster University’s Academic Accommodation of Students with Disabilities policy.

### **REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK**

McMaster Student Absence Form (MSAF): 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”.

### **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. <http://www.mcmaster.ca/policy/Students-AcademicStudies/Studentcode.pdf>

### **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.