

ENG PHYS 2P04  
**Applied Mechanics**  
Fall 2017  
Course Outline

**INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION**

Matt Minnick, [minnick@mcmaster.ca](mailto:minnick@mcmaster.ca), BSB/B106, Extension: 24546, Cell: (905) 818-6818

	Monday	Tuesday	Wednesday	Thursday	Friday
09:30	Office Hour!	Office Hour!	3O04 BSB/121	Office Hour!	2P BSB/244&9
10:30	2P04 Prep	Office Hour!	2P/3O Prep	Office Hour!	2P BSB/244&9
11:30	2P04 BSB/137	3O04 Prep	2P04 BSB/137	Office Hour!	2P/3O Prep
12:30	Office Hour!	3O04 BSB/115	3O04 BSB/115	Office Hour!	3O04 BSB/115
13:30	Check	Check	Check	Office Hour!	2P04 BSB/137
14:30	Check	Check	Check	Office Hour!	Check
15:30	Check	Check	Check	Office Hour!	Check
16:30	Check	Check	Check	Office Hour!	Check

Note: The “Check” times may *also* be office hours – please feel free to drop in if I’m here. However, these times are sometimes used by irregular meetings or course deliverables. You can email me to make sure I’ll be available and/or to reserve any “Office Hour!” or “Check” time for you or your group. I will always be present during an “Office Hour!” time, emergencies notwithstanding.

**TEACHING ASSISTANT OFFICE HOURS AND CONTACT INFORMATION**

Yuting Chan  
[chany5@mcmaster.ca](mailto:chany5@mcmaster.ca)

Akiv Jhirad  
[jhiradas@mcmaster.ca](mailto:jhiradas@mcmaster.ca)

Sara Makaremi  
[makares@mcmaster.ca](mailto:makares@mcmaster.ca)

**COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION**

The primary method of communication will be

1. Avenue To Learn (ATL, <http://avenue.mcmaster.ca/>) news postings for announcements - make sure to set your ATL email settings so it emails these to you.
2. Email for individual messages.

**COURSE INTENDED LEARNING OUTCOMES**

Upon successful completion of the course, you will be able to:

1. Explain a variety of core principles in mechanics, both statics and dynamics
2. Use a computer algebra system (Maple) to solve a variety of physics and math problems
3. Use a FEM solver (FlexPDE) to solve partial differential equations on complex geometries

## MATERIALS AND FEES

### LAPTOP COMPUTER:

Students should have a laptop capable of simultaneously running FlexPDE, Maple, and Microsoft Word (windows machines are recommended, price point of \$300 or up should be fine). You are required to use this for all tests and the final exam. While computers will be provided in case of an emergency, history shows them to be less reliable than student's personal computers and should be considered a last resort.

### OTHER MATERIALS:

FlexPDE Student Version (free online), Maple (Version 15 or higher), and MS Word (2007 or newer)

### REFERENCE TEXTS:

- Physics for Scientists and Engineers, Brooks Cole, Serway & Jewett, 978-1133947271 (same as first year)
- Course notes (free on ATL)

## COURSE SCHEDULE

Date	Lecture Topic	Tutorial Topic
Wed 6 Sep	Course Intro, Ch1-5, Maple Intro/Review	
Fri 8 Sep	Ch 9-10	Ch 6-8, Maple & Eng Phys Picture Day!
Mon 11 Sep	Ch 11-12, Couples & Force Transforms	
Wed 13 Sep	Review Lecture	
Fri 15 Sep	Advanced Dynamic Problems: Rocketry; FlexPDE Intro	First Year Physics With Computers
Mon 18 Sep	Advanced Dynamic Problems II: Fluidic Drag Force	
Wed 20 Sep	Review Lecture	
Fri 22 Sep	Damped Mass-Spring Systems and Resonance	Rocketry and Drag Problems with FlexPDE & Maple
Mon 25 Sep	Driven Resonance and Quality Factor	
Wed 27 Sep	Review	
Fri 29 Sep	ADPs with resonance combination problems	Resonance Problems
Mon 2 Oct	Trusses	
Wed 4 Oct	Frames	
Fri 6 Oct	Distributed Loads	Take Home Midterm 1 Q&A
Mon 9 Oct	Midterm Recess	
Wed 11 Oct	Midterm Recess	
Fri 13 Oct	Midterm Recess	
Mon 16 Oct	Internal Forces and Moments	Take home Midterm 1 Due
Wed 18 Oct	Review	
Fri 20 Oct	Normal Elasticity	Trusses, Frames, and Force & Moment Diagrams
Mon 23 Oct	Poisson's Ratio, Bulk Modulus, and Stiffness & Compliance Matrices	
Wed 25 Oct	Review	
Fri 27 Oct	Shear Stress & Strain	Elasticity I: Normal Elasticity
Mon 30 Oct	Beam solving with FlexPDE	
Wed 1 Nov	Review	
Fri 3 Nov	General Elasticity (complicated materials)	Shear & FlexPDE Beam Solving

<b>Mon 6 Nov</b>	General Elasticity in FlexPDE	
<b>Wed 8 Nov</b>	Review	
<b>Fri 10 Nov</b>	Thermal Expansion & Simple Piezoelectrics	General Elasticity & Beam Deformation
<b>Mon 13 Nov</b>	General Piezoelectrics	
<b>Wed 15 Nov</b>	Review	
<b>Fri 17 Nov</b>	Flexural Elasticity	Thermal and Piezoelectric Sensors and Actuators
<b>Mon 20 Nov</b>	Moments from Strain Differences	
<b>Wed 22 Nov</b>	Review	
<b>Fri 24 Nov</b>	Multimorph Actuator Statics	Beam Bending
<b>Mon 27 Nov</b>	Dynamic Beam Equation	
<b>Wed 29 Nov</b>	Beam Resonance	
<b>Fri 1 Dec</b>	Multimorph Actuator Design	Take home Midterm 2 Q&A
<b>Mon 4 Dec</b>	Additional Beam Resonance Problems & Midterm 2 Q&A	
<b>Wed 6 Dec</b>	Review lecture session: Q&A	Take home Midterm 2 Due

See ATL for a colour schedule, list of suggested practice problems for each lecture topic, and other useful resources.

#### ASSESSMENT

Component	Weight
Tutorial Quizzes	45% (5% each)
Tutorial Peer Evaluations	Bonus: 3%
Lecture Quizzes	Bonus: 2%
Take-Home Midterms	18% (9% each)
Final Exam	37%
Total	100%

#### ADDITIONAL DETAILS REGARDING COURSE MANAGEMENT AND ASSESSMENT

1. Class attendance mandatory. There is a strong correlation between class attendance and performance in the course.
2. The final exam spans the knowledge of the whole term. Sample exams are provided in ATL.

#### ACCREDITATION LEARNING OUTCOMES

The Learning Outcomes defined in this section are measured for Accreditation purposes only, and will not be taken into consideration in determining a student's actual grade in the course.

Outcomes	Indicators
Competence in Engineering Fundamentals	1.3
Manages time and processes effectively, prioritizing competing demands to achieve personal and team goals and objectives.	6.1
Develops and implements processes and methodologies to manage the effectiveness of a team both in terms of the quality of the work produced by the team as well as the inter-personal relationships within the team.	6.2
Works in a group, taking a leadership role as appropriate and relinquishing the leadership role as appropriate.	6.3

## 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 <http://www.mcmaster.ca/academicintegrity>.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's 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.

## ACADEMIC ACCOMMODATIONS

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 contact by phone at 905.525.9140 ext. 28652 or e-mail at [sas@mcmaster.ca](mailto:sas@mcmaster.ca).

For further information, consult McMaster University's Policy for [Academic Accommodation of Students with Disabilities](#).

## NOTIFICATION OF STUDENT ABSENCES AND SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK

1. The [McMaster Student Absence Form](#) is a self-reporting tool for Undergraduate Students to report absences DUE TO MINOR MEDICAL SITUATIONS that last up to 3 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.
2. You may submit a maximum of 1 Academic Work Missed request per term. It is YOUR responsibility to follow up with your Instructor immediately (NORMALLY WITHIN TWO WORKING DAYS) regarding the nature of the accommodation. Relief for missed academic work is not guaranteed.
3. If you are absent for reasons other than medical reasons, for more than 3 days, or exceed 1 request per term you MUST visit the Associate Dean's Office (JHE/H301). You may be required to provide supporting documentation.
4. This form must be submitted during the period of absence or the following day, and is only valid for academic work missed during this period of absence.
5. It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in his/her course.
6. You should expect to have academic commitments Monday through Saturday but not on Sunday or statutory holidays. If you require an accommodation to meet a religious obligation or to celebrate an important religious holiday, you may submit the Academic Accommodation for Religious, Indigenous and Spiritual Observances (RISO) Form to the Associate Dean's Office. You can find all paperwork needed here: <http://www.eng.mcmaster.ca/current/documents.html>

For Eng Phys 2P04, any MSAF'd material will have its weight moved to the final exam.

**NOTICE REGARDING POSSIBLE COURSE MODIFICATION**

The instructor and 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. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

**ON-LINE STATEMENT FOR COURSE REQUIRING ONLINE ACCESS OR WORK**

In this course, we will be using Avenue to Learn. 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.