Course Outline: PHYS1A03—Introductory Physics, Winter 2018

Instructors:

Instructional Assistant/
Course Coordinator: Ben Davis-Purcell, ABB 257, x26098,
phys1Acoord@physics.mcmaster.ca
Core 1: Kari Dalnoki-Veress, ABB 432, x22658, dalnoki@mcmaster.ca
Tu, Fr: 12:30 - 1:20PM, JHE 376
Core 2: Fraser Evans, ABB 236, x26075, evansfa@mcmaster.ca
Tu: 1:30 - 2:20PM, JHE 376
Th: 12:30 - 1:20PM, JHE 376
Core 3: An-Chang Shi, ABB 426, x24060, shi@mcmaster.ca
Mo, We: 1:30 - 2:20PM, JHE 376
Laboratory: Alex Vorobyov, BSB B117, x24251, voroby@mcmaster.ca

Communication:

If you wish to communicate with the course coordinator, your professor, or the lab coordinator please communicate with your McMaster email account and email their respective emails above. Do not communicate through Avenue to Learn or any other email server as these emails can often end up in spam and go unanswered.

Course web page:

http://avenue.mcmaster.ca

Log in with your McMaster ID (i.e. your email prefix) and password and select this course. There you will find important communications and all the on-line modules. This course will make extensive use of Avenue to Learn, it is your responsibility to check this frequently. The Avenue to Learn site will have a variety of resources and will be used throughout the term for posting schedules, information, links to other websites, etc.

Outline:

PHYS 1A03 is a first course in university physics, taught using examples and applications from many areas of science. The topics we will cover include the concepts of force and energy, mechanics, waves and fluids. This course is taught in a *blended learning* format which consists of both in-class lectures and an on-line web component. For PHYS 1A03 there are two hours of lectures per week with an accompanying web module. In addition there is also a laboratory component roughly every other week (5 labs in the term).

The course is hands-on, requires active participation through discussion with your peers, and laboratory investigations are carried out in the laboratory as well as at home. The format in which the course is taught, with its on-line modules, adapts itself to individual learning styles

because the pace can be chosen by you. The regular lecture component of the course will focus on review of the modules, adding further depth, and applying the physics learned to real-world examples. You will see that the physics learned in class is not stagnant, rather it is relevant to current research topics — even to current research carried out at McMaster!

As the lecturers of PHYS 1A03 we strive to share our enthusiasm for physics and how widely applicable physics is in areas that range from muscles and body mechanics, to diffusion in a cell, to space exploration and our climate. Physics is not just about sliding boxes on an inclined plane or the tension in a rope. The goal of physics is to understand the way the world works from the tiniest speck of matter to the entire cosmos. Physics is at the intersection of many disciplines (biophysics, medical physics, geophysics, etc.), ties these disciplines together, and bridges them to mathematics. More than anything we hope that by the end of the course you will share our enthusiasm for physics.

Schedule:

Week	Topics	Laboratory
Week 1	Introduction, units and unit conversion, dimensional analysis	
Week 2	Proportionality, vectors, precision and estimation	Kinematics in 1D
Week 3	Fermi questions, kinematics	
Week 4	Kinematics, vector and scalars	Forces
Week 5	Forces, free body diagrams, friction, static & dynamic equilibrium	
Week 6	Work, energy, conservation, conservative forces, potential energy	Conservation of energy
Week 7	Momentum, conservation, collisions, impulse,	
Week 8	*Review of Forces, Energy and Momentum*	Waves, superposition and reflections
Week 9	Waves, wave equation, boundary conditions, rope, sinusoidal waves	
Week 10	Superposition, interference, standing waves, sound	Home experiment
Week 11	Electromagnetic spectrum, interference, reflection, refraction, dispersion, diffraction	
Week 12	Fluid statics, pressure, Pascal's principle, buoyant force, surface tension, capillarity	

Course requirements and resources:

Textbook (Recommended): There is *no* required textbook, however, *Physics for the Life, 2nd (or 3rd) Ed.* by Zinke-Allmang and co-authors is an ideal companion to the material presented.

i>clickers (Required): i>clickers (remotes or smart device app) will be used in every class and are an integral part of the course. Register your i>clicker at **https://app.reef-education.com/#/courses** *using your McMaster ID* (i.e. your email prefix, not your student number). Full instructions on how to register are included on the Avenue to Learn course website.

Lab manual (Required): PHYS 1A03 Laboratory course manual available from the bookstore.

Lab notebook (Required): Black hard cover bound Physics Laboratory Notebooks available from the bookstore.

Calculator (Required): only the McMaster Standard Calculator will be permitted during tests and examinations. For details on what the McMaster Standard Calculator is and what models are acceptable please visit: https://registrar.mcmaster.ca/exams/requirements/.

Course notes: Copies of the lecture slides will be posted after class

On-line modules: The on-line modules are a major component of the course. Roughly one module per week will be assigned and available from the course Avenue to Learn webpage.

Marking scheme:

	Option 1*	Option 2*	Option 3*
Midterm test 1	20%	20%	0%
Midterm test 2	20%	0%	20%
Final examination	30%	50%	50%
Laboratory investigations	20%	20%	20%
Class activities (i>clicker questions)	5%	5%	5%
On-line homework and quizzes	5%	5%	5%

* Each of the three options will be evaluated and the student will receive the highest grade

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Mid-term tests and final examination (70%):

Test 1: Thursday, February 1, 2018, 7-8:30 pm
Test 2: Thursday, March 8, 2018, 7-8:30 pm
Final Examination: see McMaster Examination Timetable

The midterm tests and final exam will be multiple-choice questions. You will be tested on the material covered in class, labs, on-line modules, and assignments. The midterms will be 1.5 hours long, the final will be 2.5 hours long. If you miss a midterm, the marking scheme of Option 2 or 3 above will *automatically apply and thus you will not need to fill out a McMaster Student Absence Form* (MSAF, see "Missed work" below) or contact your associate dean's office. However, if you need to miss both midterms, you will need to fill out an MSAF or speak to your associate dean's office. There will be no make-up midterms.

Laboratory investigations (20%):

During your practical sessions, you will work in a group of, typically, 3 students on the exercises outlined in this laboratory manual. Some of these are "pencil-and-paper" exercises, in which you will make a prediction or verify some theoretical result. Others will involve making observations of some system which is set up in the laboratory, and still others will ask you to design an experiment to test a prediction. In all cases, these tasks are guided by questions posed in the manual, but the details for the steps required to come to a solution may not be spelled out in detail. The process of applying your physical knowledge to predicting, testing and verifying without direct instructions from the manual or your demonstrators is the most important aspect of the practical sessions. There will be 5 labs during the semester, 4 of those will be conducted during your lab period (worth 3% of your grade each). The fifth will be a 'home experiment' where you will be asked to conduct a practical investigation on your own (worth 8% of your final grade). *Lab 5 will be due Monday, March 26th at 11:59pm and details are provided on Avenue to Learn.*

If you miss a lab you will need to fill out a McMaster Student Absence Form (MSAF, see "Missed work" below) and contact the Instructional Assistant (Ben Davis-Purcell, phys1Acoord@physics.mcmaster.ca) as soon as possible. If you miss one of the four scheduled labs, we will try to reschedule the lab, failing this, the value of the final exam will be increased accordingly assuming proper documentation for the missed lab is provided (i.e. an MSAF). For the lab 5 home experiment, an MSAF will only serve extend the deadline by three days.

Please consult your laboratory manual for further details. Active participation in the scheduled laboratory practicals is a required part of the coursework.

Class activities (i>clicker questions) (5%):

i>clicker concept questions: We will frequently use i>clickers during class to address concept questions. Marks are assigned only for attempting the question not for getting the correct answer. All students are responsible for having an i>clicker remote or smart device with i>clicker reef polling before the second class of term. Failure to have and use an i>clicker will result in loss of marks. *Entering answers on another student's i>clicker is strictly forbidden.*

Module i>clicker questions: While i>clicker questions are frequently used in class and only graded for participation, once a week there will also be one or two i>clicker questions that not only count for participation but are also graded for correctness. These questions are based on the material presented in the on-line modules which must be reviewed before class.

All *i>clicker concept questions* and *module i>clicker questions* count towards the total grade for class activities (5%). *Only the questions answered in the core you are registered in count towards your grade.*

There will be no make-up i<clicker concept questions or module i>clicker questions. In order to obtain full marks you only need to answer 80% of the i>clicker questions. Marks for students earning less than 80% on the i>clickers will be scaled accordingly. Thus, the McMaster Student Absence Form (MSAF, see "Missed work" below) will not be accepted for missed i>clickers.

Online homework and quizzes (5%)

About once a week you will receive an online homework assignment via LON-CAPA ("Learning Online Network with Computer Assisted Personalized Approach") where you will receive personalized questions. These questions are assigned for practice and not graded. However, once a week you will have an in-class quiz *based on one of the first four questions* of the LON-CAPA assignment to be done at the beginning of class. You must arrive to class on time as you will not be given extra time to complete the quiz if you are late. *These in-class quizzes must be done independently without any aids other than paper, pen or pencil and your calculator. You may not have anything else on your desk and you may not discuss with your neighbours.* There will be 7-8 in-class quizzes and your lowest quiz mark will be dropped.

Missed work:

If you are absent from the university, lasting three days or less, you may report your absence, once per term, without documentation, using the McMaster Student Absence Form (MSAF). Absences for a longer duration must be reported to your Faculty/Program office, with documentation, and relief from term work may not necessarily be granted. Please note that the MSAF may not be used for the final examination.

For any absence reported using the MSAF you must contact the course Instructional Assistant (Ben Davis-Purcell, phys1Acoord@physics.mcmaster.ca) within 2 working days. When filling out an MSAF use Sara's name and email as the instructor of the course. Relief granted for missed work will typically result in increasing the value of your final exam. For missed labs, we will try to reschedule the lab, failing this the value of the final exam will be increased accordingly.

Learning outcomes:

PHYS 1A03 will give you a thorough preparation for applying physics concepts to the world around you. The course will prepare you for higher level courses in most areas of Science. Along with other first year science courses, PHYS 1A03 will enhance your ability to think critically and develop problem solving skills. This course is an excellent preparation for medical school and other professional schools. The topics presented in this class, together with those presented in Physics 1AA3, cover most of the material required for the MCAT. Together, these two courses (Physics 1A03 and Physics 1AA3) fulfill the requirements of many Canadian and American medical schools for 2 physics courses with labs.

Students interested in pursuing a degree or a minor in physics might consider taking the PHYS 1C03 and 1CC3 series (Modern Physics for the Chemical and Physical Sciences), since it is a more math-intensive course that can provide an in-depth preparation for a full physics degree.

Course planner:

Please refer to the schedule posted in the "Organizational Material" folder on Avenue to Learn for day-by-day schedule of class activities.

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.

Academic Accommodation of Students with Disabilities:

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 contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities. http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf

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Academic Ethics and Collaboration:

Physics is not to be done in solitary confinement. Seeking help when you have difficulties and discussing physics with your colleagues is encouraged but what you submit must be your work. Consult the instructor if there is any doubt about what is acceptable.

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and 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 kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, 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 credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.
4. Using another student's i>clicker to answer questions.