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Course Syllabus

PHY131H1S – "Introduction to Physics I"
Winter 2011, University of Toronto St. George Campus

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[Web version with email addresses removed, final exam time added Feb. 17, 2011]

Welcome! This is the first half of a two semester course designed to introduce physics to science students in fields other than physics. There are no pre-requisites for this course, but you must be currently taking or have taken university calculus (see the calendar for co-requisite information). The topics of PHY131 include motion in one, two and three dimensions, forces, gravity, Newton's Laws, momentum, energy, angular momentum, elasticity and fluids. Along the way we will be developing skills in problem solving using vector algebra and calculus, making measurements including error analysis, and working in teams of three or four in the practicals.

The course web-site is available at **http://bit.ly/eTWJgu** , or Google search "jason harlow teaching" and click on PHY131H1S Winter 2011. Marks will be posted on http://portal.utoronto.ca and a discussion board will be available there as well.

Instructor: **Jason Harlow**

> **Phone:** (416) 946-4071
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> **Email:** "jharlow" at physics dot u Toronto domain name Responding to Emails: I will endeavour to respond to email inquiries from students within 2 days. If you do not receive a reply within this period, please resubmit your question(s) and/or phone the number above (leave a message if necessary).
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> **Web Page:** http://www.physics.utoronto.ca/~jharlow/
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> **Office:** MP129A (in the "Physics Teaching Group" office of the 1st floor of the North Wing of McLennan Labs, 60 St. George St.)
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> **Winter 2011 semester Office Hours:** Mondays 2-3pm, Fridays 9-10am. In addition to these hours, you have are invited to call or email for an appointment, or just drop by my office.

Course Administrator: **April Seeley**
Office: MP129, Phone 416-946-0531, Email: "seeley" at the same domain as Harlow.

Practicals Technologists: Lilian Leung, Larry Avramidis, Phil Scolieri, Office: MP127.

Practicals Coordinators: **Vatche Deyirmenjian** Office: MP129-B, Phone: 416-946-0336, Email: "dey", **Brian Wilson** Office MP129-D, Email: "bwilson"

What you need for this course:
- Required Text: **"Physics for Scientists and Engineers" 2nd Edition (©2008) by Randall Knight.**
- An **account on www.masteringphysics.com**, which comes with the purchase of the new text at the U of T Bookstore. You can purchase an account separately at the U of T Bookstore. Online homeworks will be assigned using this web-site.
- An **i-clicker** personal response system (looks like a white remote control), which is available at the U of T bookstore. You must register your clicker to your at www.iclicker.com using your student number. In-class quizzes and surveys will be given during classes using this device.
- A **calculator**. This need not be a graphing calculator but it should have SIN, COS, TAN on it as well as EE or EXP. A calculator will be an allowed (and highly recommended!) aid during the test, exam and quizzes during Practicals.

Marking scheme:

Final Exam	40%
Term Tests on Feb. 1, Mar. 15 evenings	15% each
Teamwork performed during Practicals	15%
Online www.masteringphysics.com homework	5%
MasteringPhysics pop-quizzes during Practicals	5%
In-Class Clicker Questions	5%

Tests and Exam

Two 80 minute tests will be held on Tue. Feb. 1 from 6:10 to 7:30pm and Tue. Mar. 15 from 6:10 to 7:30pm. These tests will be held in EX100, 255 McCaul Street. A 3-hour final examination, administered by the Faculty of Arts

& Science, will be held Wednesday April 20 at 9:00 a.m. in Upper Small gymnasium Benson Building, 320 Huron Street (south of Harbord Street) [3rd floor]. Both the tests and exam will involve a combination of multiple choice and written questions, which test your understanding of course material and ability to think and apply what you have learned to simple problems. A pocket calculator with no communication ability and a 8.5"×11" double-sided piece of paper with your own hand-written notes will be permitted during the tests. Two such pieces of paper are allowed on the exam.

Practicals
In addition to classes, you will meet regularly in groups of 36 for 2 hours in Practicals in MP125-C. Attendance is mandatory. Each Practicals group is lead by two graduate student Teaching Assistants. The material is the same as what is being taught in classes, but your time will be spent in discussion, problem-solving, hands-on activities and team-work. The goals are to deepen your understanding of the physics, develop your laboratory skills and analysis techniques, and get you used to working in teams. Please see the course web-site for the Practicals schedule and marking scheme.

MasteringPhysics Online Homework
I recommend that you do MasteringPhysics homework completely on your own. Your understanding of randomly selected questions from the assigned MasteringPhysics problems will be tested during pop-quizzes held occasionally during the Practicals. Please bring a calculator to Practicals for these quizzes. The problems offered on MasteringPhysics include extensive hints which I recommend that you open (there is no penalty for doing so), and 4 attempts are allowed if you get it wrong the first time. I recommend you use scrap paper and a pen to work through the problems "offline", similar to how you would work on them for a test or exam.

- Go to http://www.masteringphysics.com/
- Click on **Register New Students.**
- You will be asked for an Access Code, which came with your new text-book purchase, or can be purchased separately from the U of T bookstore.
- You will be asked for your name. Use the exact same name that you gave on ROSI.
- You will be asked for a *Student ID*. This should be **your 9-digit student number**.
- You will choose a login and password. They will provide you with access to year.
- You will be asked for the course ID: it is **MPPHY131S11**
- Click on **Assignment List** in the upper-left corner of the screen to see the available assignments.

In-Class Clicker Questions
Every class, beginning with Class 2, I will be giving informal clicker questions based on the assigned reading, using the i-clickers. Your participation in at least one of these In-Class Questions per class using your clicker remote will count for 10 points per class you attend. In addition to the 10 free initial points, there will be 1 additional participation point per question answered, and 1 additional accuracy point for each question answered correctly. (For example, if I ask 5 questions and you get 3 of them correct, but don't bother to vote in the last one, you would get $10 + 4 + 3 = 17$ points for that class, and the maximum is 20, so you get 85%.) You *must* do your reading before coming to class in order to get the most out of these questions! The maximum number of points is the sum of the maxima from 21 classes throughout the semester. There are no clicker questions during the first class on Jan. 10, but a survey will be distributed which is worth 20 bonus clicker questions. You may do this survey at any time during the semester and receive the full 20 bonus points. Also, Jan.31 and Mar. 14 are "clicker bonus days" meaning you can get the same marks as normally available, but the possible number of points is not increased. That way, if you miss up to 3 classes during the semester, there is no penalty. If your Final Exam percentage mark is higher than your total Clicker mark, your final exam mark will replace your Clicker mark. This would effectively make the final exam worth 45% of your course mark, and Clickers worth 0% accordingly. Note there are no make-up clicker questions, and medical absences are not granted for clicker questions. For students with more than three class absences whose clicker mark ends up lower than their final exam, all of the marks are made-up with the final exam.
Discussions with others is **allowed** and even ***encouraged*** during these informal questions (though no shouting, please!!), but you must have your own remote and select your own vote in order to obtain points. If a student is caught with more than one remote, both will be confiscated and both students associated with these remotes will receive zeros for the clicker scores for the entire course – and these zeros will not be replaced with the final exam mark.

Class	Date	Topics	Homework	Required Reading, to do *before* class
1	Mon, Jan 10	· Introduction to PHY131: The structure of the course · Motion diagrams	Today's survey worth 20 clicker bonus points for participation [survey may be done at any time in the semester]	
2	Wed, Jan 12	· Position, velocity, and acceleration · Problem solving · Scaling · Units	MasteringPhysics.com *Introduction to MasteringPhysics*, [Please complete this for practice]	"Preface to the Student", Introduction Part I Overview Ch.1
3	Mon, Jan 17	· Error Analysis · Significant figures		Error Analyis Document available from course web-site – Excel spreadsheet also available for download.
4	Wed, Jan 19	· Constant Velocity Motion · Constant Acceleration Motion · Freefall, Motion on an inclined plane	MP Problem Set 1: Ch. 1 and Error Analysis Mini-Version due by 11:59pm	Ch. 2
5	Mon, Jan 24	· Scalars and vectors · Coordinate systems, Components · Vector Algebra		Ch. 3
6	Wed, Jan 26	· Kinematics in Two Dimensions · Projectile Motion · Relative Motion	MP Problem Set 2: Ch. 2, 3 and Error Analysis Mini-Version due by 11:59pm	Ch. 4, sections 4.1 to 4.4
7	Mon, Jan 31	Review for Test	Clicker Bonus Points Day!	
Test 1 EX100	**Tue, Feb 1, 6:00 PM**	**Chs. 1-3, First 4 sections of Ch.4, and Error Analysis Document**		
8	Wed, Feb 2	Circular Motion		Ch. 4, sections 4.5 to 4.7
9	Mon, Feb 7	Forces, Free Body Diagrams Newton's Second Law Newton's First Law		Ch. 5
10	Wed, Feb 9	Equilibrium Mass, Weight, Gravity	MP Problem Set 3: Chs. 4,5 due by 11:59pm	Ch. 6, sections 6.1 to 6.3
11	Mon, Feb 14	Friction, Drag Rolling without slipping Examples of Newton's Second Law		Ch. 6, sections 6.4 to 6.6
12	Wed, Feb 16	· Action / Reaction Pairs · Newton's Third Law · Ropes and Pulleys	MP Problem Set 4: Ch. 6 due by 11:59pm	Ch. 7
13	Mon, Feb 28	· Dynamics in Two Dimensions · Dynamics of Uniform Circular Motion · Fictitious Forces		Ch. 8 Part I Summary
14	Wed, Mar 2	· Momentum and Impulse · Conservation of Momentum · Collisions, Explosions	MP Problem Set 5: Ch. 7, 8 due by 11:59pm	Part II Overview Ch. 9
15	Mon, Mar 7	· Conservation of Energy · Kinetic Energy · Gravitational Potential Energy · Hooke's Law		Ch. 10, sections 10.1 to 10.5

		· Elastic Potential Energy		

Class	Date	Topics	Homework	Required Reading, to do *before* class
16	Wed, Mar 9	· Energy in Collisions · Work	MP Problem Set 6: Chs. 9, 10 due by 11:59pm	Sections 10.6, 10.7 Ch. 11, sections 11.1 to 11.3
17	Mon, Mar 14	Review for Test	Clicker Bonus Points Day!	
Test 2 EX100	**Tue, Mar 15, 6:00 PM**	**Chs. 4-10, First 3 sections of Ch.11**		
18	Wed, Mar 16	· Work, Force and Potential Energy · Thermal Energy · Power		Ch. 11, sections 11.4 to 11.9 Part II Summary
19	Mon, Mar 21	Rotational Motion, Rotational Energy Centre of Mass Moment of Inertia Torque Rotational Dynamics Equilibrium Rolling Motion Angular Momentum		Part III Overview Ch. 12
20	Wed, Mar 23	· Oscillations; Repeating Motion · Simple Harmonic Motion · Oscillations / Circular Motion Connection · Potential and Kinetic Energy in Oscillations	MP Problem Set 7: Chs. 11,12 due by 11:59pm	Ch. 14, sections 14.1 to 14.3
21	Mon, Mar 28	· Hooke's Law and Oscillation of Springs · Hanging Springs · The Pendulum · Damped Oscillations; Shock Absorbers · Driven Oscillations; Resonance		Ch. 14, sections 14.4 to 14.8
22	Wed, Mar 30	· Fluids · Pressure · Pascal's Law · Gauge Pressure	MP Problem Set 8: Ch. 14 due by 11:59pm	Ch. 15, sections 15.1 to 15.3
23	Mon, Apr 4	· Buoyancy, Archimedes Principle · Equation of Continuity · Bernoulli's Law · Elasticity		Ch. 15, sections 15.4 to 15.6 Part III Summary
24	Wed, Apr 6	Course Review	MP Problem Set 9: Ch. 15 due by 11:59pm	
Exam	**Wed, Apr. 20, 9:00 a.m.**	BN3 = Upper Small gymnasium Benson Building, 320 Huron Street (south of Harbord Street) [3rd floor] The 3 hour final exam will cover the **entire course**, including all of the assigned reading plus practicals materials and what was discussed in class		All of the above