

## PHYSICS 111.6: GENERAL PHYSICS 2007–08

<http://physics.usask.ca/phys111.htm>

### Course Objectives:

- Study of the basic principles of physics through a survey of various fields of the subject;
- Study of the applications of physical principles to technology and other scientific fields;
- Development of analytical and mathematical skills; and
- Practical application of the scientific method through laboratory experimentation.

**Prerequisites:** Physics 30 and Mathematics B30 and C30.

*Students must have previously obtained credit for all three prerequisites.*

*See your lecturer as soon as possible if you are missing any prerequisite.*

**Academic Honesty** (see <http://www.usask.ca/honesty/>):

- Students are expected to understand and abide by the principles of academic honesty and to realise that there are potentially serious consequences for dishonest behaviour.

### Midterm Grade:

Homework assignments	6%
Instructor's discretion	2%
Laboratories	20%
Test 1 (Thu 11 Oct 2007)	36%
Test 2 (Fri 16 Nov 2007)	36%
<hr/> TOTAL	<hr/> 100%

### Final Grade:

Homework assignments	6%
Instructor's discretion	2%
Laboratories	20%
Test 1 (Thu 11 Oct 2007)	8%
Test 2 (Fri 16 Nov 2007)	8%
Test 3 (Thu 24 Jan 2008)	8%
Test 4 (Thu 6 Mar 2008)	8%
Final Examination (Apr 2008)	40%
<hr/> TOTAL	<hr/> 100%

### Required Calculator:

Students are **required** to use a Hewlett-Packard HP 30S calculator for all Physics 111 exams. No other calculator may be used. (\$22.95, available at Centre Shop in Place Riel.) Students are strongly encouraged to read the user manual and use the calculator on a regular basis.

### Required Textbooks:

1. "Physics", by Cutnell & Johnson (**Seventh** edition, with WileyPlus). \$114.95
2. "A Laboratory Manual for Physics 111.6" (**revised 2006**). \$7.85
3. "Physics 111.6 Laboratory Worksheets" (**revised 2006**). \$3.75

### Internet Access is Required:

Submission of online assignments will be handled through the Physics 111 website ([physics.usask.ca/phys111.htm](http://physics.usask.ca/phys111.htm)). The website will also be used throughout the course for the dissemination of information. Students can access the website either through their University account or through another provider.

### Supplementary Materials:

1. "Student Study Guide" for Physics, 7th ed., by Cutnell & Johnson. \$49.95
2. "Student Solutions Manual" for Physics, 7th ed., by Cutnell & Johnson. \$47.95
3. "Multiple Choice Questions for Physics 111.6" (February 1997). \$9.40

## Lectures

All students **must** be registered in one of the following lecture sections:

Section 01:	MWF	1030–1120	Physics 107	Dr. Robinson
Section 02:	MWF	1130–1220	Physics 107	Mr. Zulkoskey
Section 03:	TTh	1000–1120	Physics 107	Dr. Mitchell

Proposed Lecture Schedule:

Lecture	Date	Sections to be Covered
1	W 05 Sep	Introduction to course
2	F 07 Sep	1.1. The Nature of Physics Math Quiz
3	M 10 Sep	Math review: Algebra 1.2. Units 1.3. The Role of Units in Problem Solving The Scientific Method
4	W 12 Sep	The Scientific Method (cont'd)
<b>1. MECHANICS</b>		
5	F 14 Sep	2.1. Displacement 2.2. Speed and Velocity 2.3. Acceleration 2.4. Equations of Kinematics for Constant Acceleration
6	M 17 Sep	2.5. Applications of the Equations of Kinematics 2.6. Freely Falling Bodies 2.7. Graphical Analysis of Velocity and Acceleration for ...
7	W 19 Sep	1.4. Trigonometry 1.5. The Nature of Physical Quantities: Scalars and Vectors 1.6. Vector Addition and Subtraction
8	F 21 Sep	1.7. The Components of a Vector 1.8. Addition of Vectors by Means of Components 3.1. Displacement, Velocity and Acceleration
9	M 24 Sep	3.2. Equations of Kinematics in Two Dimensions 3.3. Projectile Motion
10	W 26 Sep	4.1. The Concepts of Force and Mass 4.2. Newton's First Law of Motion 4.3. Newton's Second Law of Motion
11	F 28 Sep	4.4. The Vector Nature of Newton's Second Law of Motion 4.5. Newton's Third Law of Motion 4.6. Types of Forces: An Overview
12	M 01 Oct	4.7. The Gravitational Force 4.8. The Normal Force
13	W 03 Oct	4.9. Static and Kinetic Frictional Forces 4.10. The Tension Force
14	F 05 Oct	4.11. Equilibrium Applications of Newton's Laws of Motion 4.12. Nonequilibrium Applications of Newton's Laws of Motion

Lecture	Date	Sections to be Covered
***	M 08 Oct	<i>(University closed – Thanksgiving Day)</i>
15	W 10 Oct	5.1. Uniform Circular Motion 5.2. Centripetal Acceleration 5.3. Centripetal Force 5.4. Banked Curves
<b>TEST 1: THURSDAY 11 OCTOBER 2007 at 1900</b>		
16	F 12 Oct	5.5. Satellites in Circular Orbits 5.6. Apparent Weightlessness and Artificial Gravity
17	M 15 Oct	5.7. Vertical Circular Motion 6.1. Work Done by a Constant Force 6.2. The Work-Energy Theorem and Kinetic Energy
18	W 17 Oct	6.3. Gravitational Potential Energy 6.4. Conservative Forces, Nonconservative Forces, and ... 6.5. The Conservation of Mechanical Energy
19	F 19 Oct	6.6. Nonconservative Forces and the Work-Energy Theorem 6.7. Power 6.8. Other Forms of Energy and the Conservation of Energy
20	M 22 Oct	7.1. The Impulse-Momentum Theorem 7.2. The Principle of Conservation of Linear Momentum
21	W 24 Oct	7.3. Collisions in One Dimension
22	F 26 Oct	7.3. Collisions in One Dimension (cont'd) 7.4. Collisions in Two Dimensions 8.1. Rotational Motion and Angular Displacement 8.2. Angular Velocity and Angular Acceleration
23	M 29 Oct	8.3. The Equations of Rotational Kinematics 8.4. Angular Variables and Tangential Variables 8.5. Centripetal Acceleration and Tangential Acceleration
24	W 31 Oct	8.6. Rolling Motion 9.1. The Effects of Forces and Torques on the Motion ...
25	F 02 Nov	9.2. Rigid Objects in Equilibrium
26	M 05 Nov	9.4. Newton's Second Law for Rotational Motion About a ...
27	W 07 Nov	9.5. Rotational Work and Energy 9.6. Angular Momentum
28	F 09 Nov	10.1. The Ideal Spring and Simple Harmonic Motion
***	M 12 Nov	<i>(University closed – in lieu of Remembrance Day)</i>
29	W 14 Nov	10.2. Simple Harmonic Motion and the Reference Circle
30	F 16 Nov	10.3. Energy and Simple Harmonic Motion
<b>TEST 2: FRIDAY 16 NOVEMBER 2007 at 1700</b>		
31	M 19 Nov	10.4. The Pendulum 11.1. Mass Density 11.2. Pressure
32	W 21 Nov	11.3. Pressure and Depth in a Static Fluid 11.4. Pressure Gauges 11.5. Pascal's Principle

Lecture	Date	Sections to be Covered
33	F 23 Nov	11.6. Archimedes' Principle 11.7. Fluids in Motion 11.8. The Equation of Continuity
34	M 26 Nov	11.9. Bernoulli's Equation 11.10. Applications of Bernoulli's Equation
35	W 28 Nov	11.11. Viscous Flow
<b>2. WAVE MOTION</b>		
36	F 30 Nov	16.1. The Nature of Waves 16.2. Periodic Waves 16.3. The Speed of a Wave on a String 16.4. The Mathematical Description of a Wave
37	M 03 Dec	16.5. The Nature of Sound 16.7. Sound Intensity 16.8. Decibels
38	F 04 Jan	16.9. The Doppler Effect
39	M 07 Jan	16.10. Applications of Sound in Medicine 16.11. The Sensitivity of the Human Ear 17.1. The Principle of Linear Superposition 17.2. Constructive and Destructive Interference of Sound Waves
40	W 09 Jan	17.4. Beats 17.5. Transverse Standing Waves
41	F 11 Jan	17.6. Longitudinal Standing Waves
42	M 14 Jan	17.7. Complex Sound Waves
<b>3. ELECTRICITY AND MAGNETISM</b>		
43	W 16 Jan	18.1. The Origin of Electricity 18.2. Charged Objects and the Electric Force 18.3. Conductors and Insulators 18.4. Charging by Contact and by Induction 18.5. Coulomb's Law
44	F 18 Jan	18.6. The Electric Field
45	M 21 Jan	18.6. The Electric Field (cont'd) 18.7. Electric Field Lines
46	W 23 Jan	19.1. Potential Energy 19.2. The Electric Potential Difference
<b>TEST 3: THURSDAY 24 JANUARY 2008 at 1900</b>		
47	F 25 Jan	19.3. The Electric Potential Difference Created ...
48	M 28 Jan	19.4. Equipotential Surfaces and Their Relation to the ... 20.1. Electromotive Force and Current
49	W 30 Jan	20.2. Ohm's Law 20.3. Resistance and Resistivity

Lecture	Date	Sections to be Covered
50	F 01 Feb	20.4. Electric Power 20.5. Alternating Current
51	M 04 Feb	20.6. Series Wiring 20.7. Parallel Wiring
52	W 06 Feb	20.9. Internal Resistance
53	F 08 Feb	20.14. Safety and the Physiological Effects of Current 21.1. Magnetic Fields
54	M 11 Feb	21.2. The Force That a Magnetic Field Exerts on a Moving ... 21.3. The Motion of a Charged Particle in a Magnetic Field 21.4. The Mass Spectrometer
<b>4. LIGHT AND OPTICS</b>		
55	W 13 Feb	24.1. The Nature of Electromagnetic Waves 24.2. The Electromagnetic Spectrum
56	F 15 Feb	24.3. The Speed of Light 25.1. Wave Fronts and Rays 25.2. The Reflection of Light 26.1. The Index of Refraction
<i>M 18 to F 22 Feb – Midterm Break – no classes</i>		
57	M 25 Feb	26.2. Snell's Law and the Refraction of Light 26.3. Total Internal Reflection
58	W 27 Feb	26.5. The Dispersion of Light: Prisms and Rainbows 26.6. Lenses 26.7. The Formation of Images by Lenses
59	F 29 Feb	26.8. The Thin-Lens Equation and the Magnification Equation 26.9. Lenses in Combination
60	M 03 Mar	26.10. The Human Eye
61	W 05 Mar	26.11. Angular Magnification and the Magnifying Glass 26.12. The Compound Microscope 26.13. The Telescope
<b>TEST 4: THURSDAY 6 MARCH 2008 at 1900</b>		
62	F 07 Mar	26.14. Lens Aberrations 27.1. The Principle of Linear Superposition 27.2. Young's Double-Slit Experiment
63	M 10 Mar	27.7. The Diffraction Grating
<b>5. MODERN PHYSICS</b>		
64	W 12 Mar	29.1. The Wave-Particle Duality 29.2. Blackbody Radiation and Planck's Constant 29.3. Photons and the Photoelectric Effect
65	F 14 Mar	29.3. Photons and the Photoelectric Effect (cont'd) 29.4. The Momentum of a Photon and the Compton Effect

Lecture	Date	Sections to be Covered
66	M 17 Mar	30.1. Rutherford Scattering and the Nuclear Atom 30.2. Line Spectra 30.3. The Bohr Model of the Hydrogen Atom
67	W 19 Mar	30.3. The Bohr Model of the Hydrogen Atom (cont'd) 30.7. X-rays
***	F 21 Mar	<i>(University closed – Good Friday)</i>
68	M 24 Mar	30.8. The Laser
69	W 26 Mar	31.1. Nuclear Structure 31.2. The Strong Nuclear Force and the Stability of the Nucleus 31.3. The Mass Defect of the Nucleus and Nuclear Binding ...
70	F 28 Mar	31.4. Radioactivity
71	M 31 Mar	31.5. The Neutrino 31.6. Radioactive Decay and Activity
72	W 02 Apr	31.6. Radioactive Decay and Activity (cont'd) 31.7. Radioactive Dating
73	F 04 Apr	31.8. Radioactive Decay Series 31.9. Radiation Detectors 32.1. Biological Effects of Ionising Radiation
74	M 07 Apr	32.2. Induced Nuclear Reactions 32.3. Nuclear Fission 32.4. Nuclear Reactors 32.5. Nuclear Fusion

### Final Examination

Students who obtain an average mark of less than 30% on the four tests will be excluded from the final examination. The instructor will submit a computed grade for the course which factors in the final examination as a zero.

If a student misses one or more tests with permission of the instructor, then the same rule shall apply but the average shall be determined from the tests that were written. (A mark of 0 is assigned to a test that is missed without permission.)

### Tutorials

Tutorials are an integral part of this course and students are expected to attend. Students should be registered in one of the following tutorial sections:

T01	T	1330–1420
T02	T	1500–1550
T03	W	1330–1420
T04	W	1500–1550
T05	Th	1330–1420
T06	Th	1500–1550
T07	M	1330–1520

The tutorials will be held in Room 130 Physics.

In addition to the tutorials, a Help Desk will be open Tuesdays, Wednesdays, and Thursdays from 1300 to 1630 in Room 126 Physics.

## Homework Assignments

- Each week there will be two homework assignments: one assignment to be submitted online and one assignment to be submitted in writing.

### Online Assignments

- The weekly online assignment will consist of 2 multiple choice problems and 3 multiple choice qualitative questions, each worth one mark.
- You should keep a separate notebook for your homework. Solve each problem with a complete written solution, following the methods outlined in the lectures and in the Survival Guide.
- Compare your answer with the choices given in the question. If there is a match, then indicate your selection on the Online Assignment Submission form on the Physics 111 Website (<http://physics.usask.ca/phys111.htm>). If you do not get a match, you have made a mistake in your solution; you should go back and check your work.
- The online assignments are due at 1200 on Fridays. Late assignments will not be accepted. Assignments not submitted will receive a mark of zero.

### Written Assignments

- The weekly written assignment will consist of 5 problems. Solve each problem with a complete written solution, following the methods outlined in the lectures and in the Survival Guide.
- One problem will be selected to be hand-marked. The selected problem will be worth 3 marks and will be marked in 1 mark increments.
- The written assignments are due at the beginning of class on Thursdays (section 03) or Fridays (sections 01 and 02). Late assignments will not be accepted. Assignments not submitted will receive a mark of zero.
- The assignment solutions will be posted to the Physics 111 Website and will remain posted for the duration of the course.
- The marks for each assignment will be posted by your instructor.

## Etiquette

### Email Etiquette:

- All emails to Professors, lab instructors, department administrators, etc. are **official communication** with the University.
- Good rules to follow:
  - Course name in subject header, e.g., "PHYS 111 (03) - Test 2 Question"
  - Always address recipient courteously, e.g., "Dear Prof. Smith,"
  - Always include your name, student number, and course name & section in your email.
  - Use full sentences and describe your question or situation completely and clearly. Be concise.
  - Re-read your complete message before sending.

**Exam Etiquette/Rules:**

- Turn off cell phones before entering the examination room.
- Only Hewlett-Packard HP-30S calculators may be used. No other electronic device is allowed at your desk (e.g. cell phone, pager, PDA, iPod, MP3 player, electronic dictionary...)
- No written material is allowed at your desk other than the test paper, formulae sheet and OpScan sheet.
- Bring your student card, a pen, two soft-lead (HB) pencils, eraser, and straightedge.

**Laboratories**

Laboratory work is an integral part of the course and must be completed to obtain credit. See the laboratory policy for Physics 111 below. Students must be registered in one of the following laboratory sections:

L01	T	1230–1450
L02	T	1500–1720
L03	W	1230–1450
L04	W	1500–1720
L05	Th	1230–1450
L06	Th	1500–1720
L07	F	1330–1550

**Introductory laboratory sessions** will be held during the week 10-14 Sep. Times and locations for the introductory lab sessions are posted below. Students who are eligible for waivers from laboratory work (a lab exemption) should report to one of the introductory sessions to obtain a written waiver.

Lab	Date	Time	Room
L01	T 11 Sep	<b>1300</b>	Physics 165
L02	T 11 Sep	1500	Physics 103
L03	W 12 Sep	<b>1330</b>	Engineering 2B53
L04	W 12 Sep	1500	Physics 165
L05	Th 13 Sep	<b>1300</b>	Physics 165
L06	Th 13 Sep	1500	Engineering 2C44
L07	F 14 Sep	1330	Engineering 2B53

**Physics 111 Laboratory Policy**  
**Regular Session 2007-08**

1. Laboratory work is an integral part of the course. A student will not receive a passing grade for the course unless **all** of the experiments have been completed. Failure to complete the laboratory work will result in failure in the course.
2. Withdrawing from Physics 111 implies withdrawing from the laboratory work in the course as well. You may not continue laboratory work after withdrawing from the course, even if you decide to continue to attend the lectures.
3. If you withdraw from Physics 111 after completing at least the first term with an average laboratory mark of at least 70%, and you then repeat the course in a later session but within three years, you may request exemption from the first term labs. Your first term laboratory mark will be

the average mark you received for the experiments already performed. You must then perform the remaining experiments in second term.

4. If you complete Physics 111 with a final grade of 40% or higher and complete the laboratory work with an average laboratory mark of at least 70%, and you then repeat the course in a later session but within three years, you may request exemption from all of the labs. Your laboratory mark for the year will be the average mark you received for the experiments already performed.
5. If you complete Physics 111 with a final grade of less than 40%, or if you are excluded from the final examination, or if you withdraw after the February 15 deadline (WF), **no** laboratory exemption will be granted (neither partial nor full).
6. Laboratory exemptions are not automatic. To request an exemption from laboratory work, you must contact Laverne Sander in Room 112 Physics (email *Laverne.Sander@usask.ca*).

B. Zulkoskey  
23 July 2007

### Physics 111 Laboratory Schedule 2007-08

Dates				Experiments	
T	W	Th	F	Groups 1 to 10	Groups 11 to 20
11 Sep	12 Sep	13 Sep	14 Sep	INTRODUCTION	INTRODUCTION
18 Sep	19 Sep	20 Sep	21 Sep	M1 - Rm 117	M1 - Rm 112
25 Sep	26 Sep	27 Sep	28 Sep	M34 - Rm 117	M34 - Rm 112
02 Oct	03 Oct	04 Oct	05 Oct	M35 - Rm 112	M18 - Rm 125
09 Oct	10 Oct	11 Oct	12 Oct	M18 - Rm 117	M35 - Rm 112
16 Oct	17 Oct	18 Oct	19 Oct	M14 - Rm 117	M3 - Rm 131
23 Oct	24 Oct	25 Oct	26 Oct	M3 - Rm 112	M14 - Rm 117
30 Oct	31 Oct	01 Nov	02 Nov	M36 - Rm 117	M37 - Rm 112
06 Nov	07 Nov	08 Nov	09 Nov	M37 - Rm 112	M36 - Rm 117
13 Nov	14 Nov	15 Nov	16 Nov	M39 - Rm 117	M19 - Rm 112
20 Nov	21 Nov	22 Nov	23 Nov	M19 - Rm 112	M39 - Rm 117
27 Nov	28 Nov	29 Nov	30 Nov	NO LABS	NO LABS
08 Jan	09 Jan	10 Jan	11 Jan	Intro - Rm 112	Intro - Rm 112
15 Jan	16 Jan	17 Jan	18 Jan	S2 - Rm 112	S1 - Rm 117
22 Jan	23 Jan	24 Jan	25 Jan	S1 - Rm 117	S2 - Rm 112
29 Jan	30 Jan	31 Jan	01 Feb	E7 - Rm 112	E7 - Rm 117
05 Feb	06 Feb	07 Feb	08 Feb	E13 - Rm 117	H14 - Rm 112
12 Feb	13 Feb	14 Feb	15 Feb	H14 - Rm 112	E13 - Rm 117
19 Feb	20 Feb	21 Feb	22 Feb	BREAK	BREAK
26 Feb	27 Feb	28 Feb	29 Feb	L13 - Rm 112	L13 - Rm 112
04 Mar	05 Mar	06 Mar	07 Mar	L11 - Rm 117	L3 - Rm 112
11 Mar	12 Mar	13 Mar	14 Mar	L3 - Rm 112	L11 - Rm 117
18 Mar	19 Mar	20 Mar	<b>28 Mar</b>	MP9 - Rm 112	MP6 - Rm 117
25 Mar	26 Mar	27 Mar	<b>04 Apr</b>	MP6 - Rm 117	MP9 - Rm 112