Physics 117.3: Physics for the Life Sciences

University of Saskatchewan

2010 Spring and Summer Session Q4

1 Instructor

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2 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, health sciences, and other scientific fields
- Development of analytical, mathematical, and problem-solving skills
- Practical application of the scientific method through laboratory experimentation

3 Prerequisites

Physics 115.3

4 Academic Honesty

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

5 Composition of Grade

In-Class Responses	5%
Homework Assignments	13%
Laboratories	15%
Midterm (Friday August 6th)	22%
Final Exam (August 18th 9:00 AM)	45%
TOTAL	100%

6 Required Calculator

Students are **required** to use a Texas Instruments TI-30X series calculator or a Hewlett-Packard HP 30S calculator for all Physics 117 exams. No other calculator may be used. Students are strongly encouraged to read the user manual and use the calculator on a regular basis.

7 Required Response Device ("Clicker")

Students are **required** to have a TurningPoint Audience Response device (a clicker) for use during all Physics 117 lectures. Clickers are available for purchase from the Campus Computer Store. You must register your clicker's unique serial number in PAWS to identify yourself as the user. Do not lend your clicker to other students. If you do not register the clicker, we will not know that you are responding in class!

8 Required Textbooks

- *College Physics* 3rd Edition, by Giambattista and Richardson (McGraw Hill Higher Education) $170.95
- *A Laboratory Manual for Physics 117.3/125.3* (**Revised 2010**) $5.45

9 Supplementary Materials

- *Student Solutions Manual* to accompany College Physics 3rd Edition. $78.95

10 Internet Access Is Required

All aspects of the course will be coordinated through the online Blackboard Learning System. Students can access the course website either through their University account or through another provider.

11 Lectures

All students **must** be registered in the course to attend the lectures.
Proposed Lecture Schedule:

Lecture	Date	Section	Description
			Mechanics
1	T July 27	8.1	Rotational Kinetic Energy and Rotational Inertia
		8.2	Torque
		8.3	Calculating work done by a torque
		8.4	Rotational Equilibrium
2	W July 28	8.5	Equilibrium in the human body
		8.6	Rotational Form of Newton's Second Law
		8.8	Angular Momentum (omit Kepler's Laws)
		9.1	States of Matter
		9.2	Pressure
		9.3	Pascal's Principle
		9.4	The effect of Gravity on Fluid Pressure
		9.5	Measuring Pressure
3	Th July 29	9.6	The Buoyant Force
		9.7	Fluid Flow
		9.8	Bernoulli's Equation
		9.9	Viscosity
		9.10	Viscous Drag
		9.11	Surface Tension
		10.1	Elastic Deformations of Solids
4	F July 30	10.2	Hooke's Law for Tensile and Compressive Forces
		10.3	Beyond Hooke's Law
		10.4	Shear and Volume Deformations
		10.5	Simple Harmonic Motion
		10.6	The Period and Frequency for SHM
		10.7	Graphical Analysis of SHM
5	T Aug 3	10.8	The Pendulum
		10.9	Damped Oscillations
		10.10	Forced Oscillations and Resonance
		11.1	Waves and Energy Transport
		11.2	Transverse and Longitudinal Waves
		11.3	Speed of Transverse Waves on a String
		11.4	Periodic Waves
		11.5	Mathematical Description of a Wave
		11.6	Graphing Waves
		11.7	Principle of Superposition
6	W Aug 4	11.8	Reflection and Refraction
		11.9	Interference and Diffraction
		11.10	Standing Waves
		12.1	Sound Waves
		12.2	The Speed of Sound Waves
		12.3	Amplitude and Intensity of Sound Waves
7	Th Aug 5	12.4	Standing Sound Waves
		12.5	Timbre
		12.6	The Human Ear
		12.7	Beats
		12.8	The Doppler Effect
		12.9	Echolocation and Medical Imaging

Lecture	Date	Section	Description
			Electromagnetic Waves And Optics
		22.1	Maxwell's Equations and Electromagnetic Waves
		22.3	The Electromagnetic Spectrum
8	Fr Aug 6	22.4	Speed of EM Waves in Vacuum and in Matter
		22.5	Characteristics of EM Waves in Vacuum
		23.1	Wavefronts, Rays, and Huygens's Principle
		23.2	The Reflection of Light
		23.3	The Refraction of Light: Snell's Law
		23.4	Total Internal Reflection
		23.9	Thin Lenses
		24.1	Lenses in Combination
			MIDTERM EXAM
9	M Aug 9	24.2	Cameras
		24.3	The Eye
		24.4	Angular Magnification and the Simple Magnifier
		24.5	Compound Microscopes
		25.1	Constructive and Destructive Interference
10	T Aug 10	25.4	Young's Double-Slit Interference
		25.5	Gratings
		25.6	Diffraction and Huygens's Principle
		25.8	Diffraction and the Resolution of Optical Instruments
			Thermal Physics
		13.1	Temperature and Thermal Equilibrium
		13.2	Temperature Scales
		13.3	Thermal Expansion of Solids and Liquids
11	W Aug 11	13.4	Molecular Picture of a Gas
		13.5	Absolute Temperature and the Ideal Gas Law
		13.6	Kinetic Theory of the Ideal Gas
		13.7	Temperature and Reaction Rates
		13.8	Diffusion
		14.1	Internal Energy
		14.2	Heat
		14.3	Heat Capacity and Specific Heat
		14.6	Thermal Conduction
12	Th Aug 12	14.7	Thermal Convection
		14.8	Thermal Radiation
			Quantum and Particle Physics
		28.1	The Wave-Particle Duality
		28.2	Matter Waves
		28.3	Electron Microscopes
		28.4	The Uncertainty Principle
		28.9	Lasers
		29.1	Nuclear Structure
13	F Aug 13	29.2	Binding Energy
		29.3	Radioactivity
		29.4	Radioactive Decay Rates and Half-Lives
14	M Aug 16	29.5	Biological Effects of Radiation
		29.6	Induced Nuclear Reactions
		29.7	Fission
		29.8	Fusion
15	T Aug 17		Review

12 Tutorials

Tutorials are an integral part of this course and students are expected to attend. The tutorials will be held in Room 107 Physics (the lecture theater).

13 Homework Assignments

- There will be daily online homework assignments (accessed through the Assessments link in Blackboard)
- 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 answers with the choices given in the question. If you do not get a match, you have made a mistake in your solution, and you should go back and check your work.
- The assignments are due at 0800 the following day (Mondays for Friday assignments). Late assignments will not be accepted. Assignments not submitted will receive a mark of zero.
- The assignment solutions will be posted to the Physics 117 web site and will remain posted for the duration of the course.

14 Etiquette

14.1 Classroom Etiquette

- Turn off all cell phones and other communication devices whilst in class
- Do not distract other students by talking while class is in progress.

14.2 Email Etiquette

All emails to Professors, lab instructors, department administrators, etc. are **official communication** with the University. Good rules to follow are:

- Course name in subject header, e.g. "Physics 117 - Test 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

14.3 Exam Etiquette/Rules

- Turn off cell phones before entering the examination room.
- Only Texas Instruments TI-30X series calculator or a Hewlett-Packard HP 30S calculators may be used. No other electronic devices are 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, formula sheet and OpScan sheet
- Bring your student card, a pen, two soft-lead (HB) pencils, eraser, and straightedge.

15 Physics 117 Laboratory Policy

Students **MUST** go to the laboratory introduction on Wednesday July 28th if you are to be permitted to attend the labs.

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 from the course.
2. Withdrawing from Physics 117 implies withdrawing from the laboratory work in the course as well. You may not continue the laboratory work after withdrawing from the curse, even if you decide to continue to attend the lectures.
3. If you complete Physics 117 with a final grade of 40% or higher and complete the laboratory work with an average laboratory mark of at least 70%, and you repeat the course in a later session 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.
4. If you complete Physics 117 with a final grade of less than 40%, or if you are excluded from the final examination, or if you withdrawal after the deadline for withdrawal without academic penalty, **no** laboratory exemption will be granted.
5. Laboratory exemptions are not automatic. Students who have completed at least the first term of Phys 111 labs withing the last three years **may** qualify for a **partial** lab exemption for Phys 117 on a lab by lab basis. To request an exemption from the laboratory work, you must contact Laverne Sander in Room 112 Physics (email laverne.sander@usask.ca)

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Tentative Lab Schedule (May change a **LOT**, based on final enrolment)

LABS BEGIN AT 1:30 p.m. & END AT 4:20 p.m.

Lab introduction is MANDATORY

Date	Group A			Group B		
July		Expt	Room		Expt	Room
26 Mo						
27 Tu	-	-	-	-	-	-
28 We	LS	Lab Intro	107	LS	Lab Intro	107
29 Th	LS/JF	M39	125	-	-	-
30 Fr	-	-	-	-	-	-
Aug 2 Mo	HOLIDAY			HOLIDAY		
3 Tu	-	-	-	LS/JF	M39	125
4 We	LS/JF	M19	112	-	-	-
5 Th	-	-	-	LS/JF	M19	112
6 Fr	JS	Midterm exam	107	JS	Midterm exam	107
9 Mo	LS/JF	L11	117	-	-	-
10 Tu	-	-	-	LS/JF	L11	117
11 We	LS/JF	MP6	117	-	-	-
12 Th	-	-	-	LS/JF	MP6	117
13 Fr	LS/JF	MP9	112	LS/JF	MP9	112
16 Mo	-	-	-	-	-	-
17 Tu	-	-	-	-	-	-
18 We	9:00am	FINAL	TBA	9:00am	FINAL	TBA

LS: Laverne Sander JF: Jay Forrest JS: Jason Sadowski

NOTE: Midterm exam is Fri, Aug 06, 1:30 p.m. to 3:00 p.m., Rm 107 Physics