SYLLABUS PHY 1020, Fall 2018, Prof. SHAH

Instructor: Prof. Nausheen R. Shah
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Office Hours: M 2-3 pm or by appointment (subject to change).

Class Details: 08/29/17 - 12/12/17
Location and Time: 1117 Science Hall, M, W, F 10:30 - 11:20 AM
Text: Ostdiek & Bord: "Inquiry into Physics", 8th edition
FINAL EXAM: Wed, Dec 12, 10:15AM – 12:15PM NOTE SPECIAL TIME

If you do not need a hard copy, you can get a free ebook with the enrollment to WebAssign.
We will also be using clicker (iClicker-2) for in-class quizzes and other assignments.

Assignments and Exams:

Physics can only be learned by engaging with the material. To help you do that, you will be asked to read the text before each lecture and to complete regular assignments. These assignments will be accessible via the WebAssign and the Canvas systems. You therefore need access to a computer. If you do not own a computer, the undergraduate library has a computer lab for your use or you can use computers available at every public library.

- Assignments:
  - Web-based: Need to register for WebAssign, Wayne State ID, access to Canvas.
- In class: Reading, quizzes and other assignments (need to activate iClicker-2)
- Exams: 3 midterm exams (two best count towards grade), one final exam
- Additional homework: Not counted for grade, but necessary preparation for exams

Grading schedule:	With lab	No lab
WebAssign	16%	20%
Two best midterm exams	44%	50%
Final Exam	30%	30%
Lab	10%	N/A
Clicker questions	15%	15%
TOTAL	115%	115%
OTHER BONUS		
Third hourly exam	4%	4%
Planetarium	1%	1%

Grade determination:
A: 90+ %, A-: 85-89%
B+: 80-84%, B: 75-79%, B-: 70-74%
C+: 65-69%, C: 60-64%, C-: 55-59%
D+: 50-54%, D: 40-49%
F: below 40%

Hints for getting a good grade:

- COME TO CLASS!!
- Do the reading assignments, quizzes and homework!
- *You* are responsible for your grade. You will get a good grade if you come to class and do your work diligently. No excuses will be accepted at the end of the semester. Your grade will be determined fairly by your grades on the assignments and exams and ***nothing else***.

WEBASSIGN:

Weekly assignments will be posted on WebAssign. (***http://webassign.net***), which provides online homework submission and grading. If you buy the textbook in the campus store, it should include a WebAssign access card valid for two semesters. Access codes can also be acquired separately from WebAssign; *in this case you will have access to a free interactive ebook.* Once you have the code, you should enroll in WebAssign. This class is called PHY 1020 (no sections).
The class key is **wayne 6548 0303**. Please also enter your student ID when registering to WebAssign. IF YOU USE the

communicate tool in WebAssisgn, please also email me separately to inform me. The system DOES NOT tell me unless I login to view messages.

CLICKER:

If you don't have i> Clicker, it can be purchased at the University bookstore. You need i> Clicker-2 to be able to enter numeric characters. **The last day of clicker registration is Mon, September 10.**

PLANETARIUM SESSION:

Your instructor, along with the Department of Physics and Astronomy, is offering you a chance to learn more about the night sky and earn a bit of extra credit in the process. During the semester several 55 minute sessions will be held in the Wayne State University planetarium (in 0209 Old Main) for which you can earn 1% extra credit. To ensure that you receive credit for attending the show, please make sure you check-in both before and after the show with the planetarium personnel. For more information go to ***http://planetarium.wayne.edu/shows/index.php***

THE RULES

Please review these rules carefully.

1. **Make-up midterm exams**: There will be **NO make-up** midterm exams for any reason. Since we count the best two out of three midterms, if you have to miss one, we will just count that one as the one that will not enter your main grade. If you miss more than two midterms, you should consider dropping the class.
2. **Make-up final exam**: There will be **NO make-up** or **early** final exam and it cannot be dropped. The date & time of the final exam is published in this syllabus and it is your responsibility to arrange work schedules, vacations etc., in such a way that you can take the final. If that is not possible, consider taking this class at a later date when you have sufficient time.
3. **Laboratory credit**: If you sign up for the 4 credit version of this class you are expected to participate in the laboratory. If you are signed up for the lab, you MUST complete all your lab assignments. You can drop two lowest scored lab reports, i.e. to have 10 out of 12 labs. However, if you miss more than 3 lab reports (i.e. submit less than seven reports altogether), you will receive a FAIL (F) for the entire course, even the lecture portion.
4. **Incomplete**: As a rule I will not hand out any incomplete grades. Make sure to complete all necessary work during the semester or, if that is not possible, drop the class.
5. **Non-participating students**: If you are enrolled in this class, but do not show up or produce insufficient work, you will receive a Fail grade (F). This grade is final and will not be changed at a later date. So, if you decide to not show up to class anymore make sure to drop the class!!
6. **Grades**: Grades will be determined by the scheme in this syllabus on a numerical basis only. I will not accept any special pleading at the end of the semester. You know what grade you need, so work for it!
7. **Bonus**: There will be no extra bonus beyond what is published in this syllabus.
8. **Mathematics**: This course expects that you can do arithmetic and simple algebra roughly at the level of high school that is required by the university for you to graduate. If you are not able to do algebra on this level, please consult a book, such as Schaum's outline "Beginning Algebra".
9. **Cheating**: Any actual or attempted cheating will automatically result in a Fail grade (F) for the entire course, and a report to the university for further disciplinary action.

Religious holidays:

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify me well in advance so that mutually agreeable alternatives may be worked out.

Student Disabilities Services:

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. The SDS telephone number is 313-577-1851 or 313-202-4216 for videophone use. Once you have met with your disability specialist, I will be glad to meet with you privately during my office hours to discuss your accommodations. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University. You can learn more about the disability office at www.studentdisability.wayne.edu.

To register with Student Disability Services, complete the online registration form at:
https://wayne-accommodate.symplicity.com/public_accommodation/

Counseling and Psychological Services (CAPS):

It is quite common for college students to experience mental health challenges, such as stress, anxiety and depression, that interfere with academic performance and negatively impact daily life. Help is available for any currently enrolled WSU student who is struggling with a mental health difficulty, at WSU Counseling and Psychological Services (caps.wayne.edu; 313 577-3398). Other options, for students and nonstudents, include the Counseling and Testing Center, and the Counseling Psychology Training Clinic, in the WSU College of Education (coe.wayne.edu/tbf/counseling/center-index.php). Services at all three clinics are free and confidential. Remember that getting help, before stress reaches a crisis point, is a smart and courageous thing to do – for yourself, and for those you care about. Also, know that the WSU Police Department (313 577-2222) has personnel trained to respond sensitively to mental health emergencies at all hours.

Academic Dishonesty -- Plagiarism and Cheating:

Academic misconduct is any activity that tends to compromise the academic integrity of the institution or undermine the education process. Examples of academic misconduct include:

- **Plagiarism:** To take and use another's words or ideas as your own without appropriate referencing or citation.
- **Cheating:** Intentionally using or attempting to use or intentionally providing unauthorized materials, information or assistance in any academic exercise. This includes copying from another student's test paper, allowing another student to copy from your test, using unauthorized material during an exam and submitting a term paper for a current class that has been submitted in a past class without appropriate permission.
- **Fabrication:** Intentional or unauthorized falsification or invention of any information or citation, such as knowingly attributing citations to the wrong source or listing a fake reference in the paper or bibliography.
- **Other:** Selling, buying or stealing all or part of a test or term paper, unauthorized use of resources, enlisting in the assistance of a substitute when taking exams, destroying another's work, threatening or exploiting students or instructors, or any other violation of course rules as contained in the course syllabus or other written information.

Such activity may result in failure of a specific assignment, an entire course, or, if flagrant, dismissal from Wayne State University. https://doso.wayne.edu/conduct/academic-misconduct

Course Drops and Withdrawals:

In the first two weeks of the (full) term, students can drop this class and receive 100% tuition and course fee cancellation. After the end of the second week there is no tuition or fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request on Academica. You will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after the end of the tenth week. Students enrolled in the 10th week and beyond will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at:
https://reg.wayne.edu/students/information#dropping

Student Services:

• The Physics Resource Center is located in Rm 172 in the Physics Research Building (666 W. Hancock St.). Undergraduates taking physics courses can receive free tutoring from Physics Graduate Teaching Assistants (GTAs) in the Physics Resource Center. The Resource Center is open during normal semester hours. For details see: http://physics.clas.wayne.edu/current/resources

• The Academic Success Center (1600 Undergraduate Library) assists students with content in select courses and in strengthening study skills. Visit www.success.wayne.edu for schedules and information on study skills workshops, tutoring and supplemental instruction (primarily in 1000 and 2000 level courses).

• The Writing Research and Technology Zone is located on the 2nd floor of the Undergraduate Library and provides individual tutoring consultations free of charge. Visit http://clasweb.clas.wayne.edu/writing to obtain information on tutors, appointments, and the type of help they can provide.

• Library research assistance: Working on a research assignment, paper or project? Trying to figure out how to collect, organize and cite your sources? Wayne State librarians provide on-campus or online personalized help. Contact them at: https://library.wayne.edu/forms/consultation_request.php

SCHEDULE: Subject to change, except for exam dates. Latest version will be posted on the web.

DAY	TOPICS	*READING:*	*LABS:*
W, 8/29	*Intro, Math, Physics, The "Scientific method", Syllabus, class Info*	pp. 2 - 6	No Lab
F, 8/31	*Units, conversions, time, frequency, period, position, distance*	Chap 1.1	
M, 9/3	***Labor Day***	**N/A**	
W, 9/5	*Speed, velocity, direction, vectors*	Chap 1.2 a, b	
F, 9/7	*Vectors, vector addition*	Chap 1.2 c	
M, 9/10	*Acceleration, free fall,*	Chap 1.3	2. Measurement and Prediction
W, 9/12	*Types of motion*	Chap 1.4	
F, 9/14	*Force, Newton's first law, mass*	Chap 2.1 - 2.2	
M, 9/17	*Newton's first law demonstration. Newton's second law.*	Chap 2.3 - 2.4	3. Velocity and Acceleration
W, 9/19	*Motions & forces. Examples.*	Chap 2.5	
F, 9/21	*Newton's third law. Examples.*	Chap 2.6	
M, 9/24	*The law of universal gravitation, Planetary orbits, tides*	Chap 2.7	4. Free Fall
W, 9/26	*Review Exam 1*		
F, 9/28	**EXAM 1**	**Prologue, Chapters 1-2**	
M, 10/1	*Conservation laws, linear momentum, impulse*	Chap 3.1 – 3.2	5. Newton's Law of Motion
W, 10/3	*Work, energy, potential & kinetic energy, energy conservation*	Chap 3.3 – 3.5	
F, 10/5	*Collisions, power*	Chap 3.6 – 3.7	
M, 10/8	*Rotation and angular momentum*	Chap 3.8	6. Conservation of Momentum
W, 10/10	*Matter, atoms, molecules, density, pressure*	Chap 4.1 – 4.3	
F, 10/12	*Fluid pressure, Archimedes' Pascal's and Bernoulli's principles*	Chap 4.4 – 4.7	
M, 10/15	*Temperature, thermal expansion, 1st law of thermodynamics,*	Chap 5.1 – 5.3	9. Density and Hydrometers
W, 10/17	*Heat transfer, specific heat*	Chap 5.4 – 5.5	
F, 10/19	*Phase transitions, humidity, heat engines, 2nd law of thermodynamics*	Chap 5.6 – 5.7	
M, 10/22	*Waves: amplitude, frequency, wavelength, reflection, Doppler effect, diffraction, interference.*	Chap 6.1 – 6.6	10. Heat
W, 10/24	*Review Exam 2*		
F, 10/26	**EXAM 2**	***Chapters 3 - 6***	
M, 10/29	*Electricity, charge, Coulomb's law, electric field*	Chap 7.1 – 7.2	13. Periodic Motion
W, 10/31	*Electric currents, Ohm's law, superconductivity*	Chap 7.3	

F, 11/2	*Circuits, power, AC, DC currents*	Chap 7.4 – 7.5	
M, 11/5	*Magnetism, electromagnetism, transformers*	Chap 8.1 – 8.3	11. Circuits
W, 11/7	*EM waves, blackbody radiation*	Chap 8.5 – 8.7	
F, 11/9	*Light, optics, polarization, diffraction, interference*	Chap 9.1	
M, 11/12	*Reflection, refraction, mirrors*	Chap 9.2	12. Electromagnetism
W, 11/14	*Total internal reflection, lenses, image formation, Lens formula, magnification, aberrations, dispersion, color*	Chap 9.3 – 9.7	
F, 11/16	*Review Exam 3*		
M, 11/19	**EXAM 3**	**Chapters 7 - 9**	No Lab
11/21 - 11/25	***Thanksgiving BREAK***	N/A	
M, 11/26	*Atomic physics, photons, blackbody radiation, photoelectric effect*	Chap 10.1 – 10.2	15. Wave Nature of Light
W, 11/28	*Atomic spectra, Bohr model*	Chap 10.3 – 10.4	
F, 11/30	*Quantum Mechanics, Atomic Structure*	Chap 10.5 – 10.6	
M, 12/3	*X-ray spectra, lasers, nuclear physics, radioactivity, half-life, radioactive dating, nuclear binding energy, fission, fusion*	Chap 10.7 – 10.8, Chap 11.1 – 11.7	16. Spectroscopy
W, 12/5	*Special Relativity*	Chap 12.1 – 12.2	
F, 12/7	*Standard Model of Physics and Cosmology*	Chap 12.3 – 12.6	
M, 12/10	*Review – Student Led*	Everything – Prepare Questions	No Lab
T, 12/11	*Study Day*		
W, 12/12 10:15AM-12:15PM	***FINAL EXAM***	**EVERYTHING**	

FINAL EXAM: Wed, December 12, 10:15AM-12:15PM

Learning Outcomes

After completing this class, you are expected to be familiar with…

- The Scientific Method
  - Understand the basic principles of the scientific method.
  - Understand the notions of hypothesis, model, theory, and law of nature.
  - Understand at a basic level the process whereby scientists use facts, obtained by quantitative measurements of natural phenomena, to compare the merits of models, and formulate an increasingly more accurate model (theory) of nature.

- Basic Scientific Theories

- Have basic understanding of the *fundamental* units of measurement for distance, time and mass, including conversions from one system of units to another, and *derived* units in terms of the fundamental units.
- Have basic familiarity with the physics principles of velocity, acceleration, energy, potential energy, force, and pressure, with particular focus on Newton's Laws of motion and gravitation.
- Have basic familiarity with fundamental laws of nature including conservation of energy, conservation of momentum, conservation of angular momentum.
- Have basic familiarity with theories about the structure of matter and forces, including the structure of the atom, structure of the nucleus, existence of several classes of elementary particles, and the fundamental forces that rule them.
- Have basic familiarity with the four fundamental forces of gravity, electromagnetism, strong nuclear force, and weak nuclear force.
- Have basic understanding of thermal energy, including the concept of temperature as a measure of the energy of a system, different ways of heat transfer, heat engines and the laws of thermodynamics.
- Have basic understanding of waves and their properties, including the notions of wavelength, frequency, amplitude, and velocity as well as reflection, diffraction and interference.
- Have a basic understanding of the nature of sound waves and light waves (electromagnetic radiation), understanding the underlying phenomenon behind radars, ultrasound, microwaves etc.
- Have basic understanding of electrical forces and electricity, including Ohms Law (relationship between voltage, current and resistance) and simple circuit diagrams, starting from the concept of charged particles, in particular electrons.
- Have a basic understanding of the rules governing optics, including reflection, refraction, magnification and dispersion. Have an understanding of how these concepts contribute to the formation of an image by a lens with a given focal length.
- Have a basic understanding of ideas underlying quantum mechanics with a particular focus on the concept of *wave-particle duality*, i.e. particles possess wave-like properties where the wave describes the probability of the particle being in a particular state.
- Have a basic understanding of nuclear reactions, including radioactive decays

and common applications.

- Have a basic understanding of Einstein's theory of relativity, including times dilation and length contraction.
- Have a basic understanding of the future of fundamental physics research, with an emphasis on familiarity with current international experiments such as the Large Hadron Collider and current theoretical research aiming for the Theory of Everything.