**Physics 150 Syllabus Section 002 Fall – 2019**

**Instructor**: Professor Jack Nelson

**Office**: 205 SFC

**Office Hours**: **M** : 10 am - noon **T** : 11 am - noon **W** : 10 – 11 am **Th :**  11 am – 1 pm

**Email**: Jenels@umich.edu

**Phone:** (313) 436-9117

**Lecture :** Tuesdays and Thursdays **9:30 – 10:45 am Room :**

**Required Text**: Fundamentals of Physics with - 10th Edition (Halliday, Resnick, and Walker)

**Suggested**: Solutions Manual, Student Edition (available in bookstore)

**Course Homepage**: Canvas

**Course** **Description**: Physics 150 is the first part of a two-semester introductory physics course. It is aimed at those wishing to major in Physics, Chemistry, or Engineering , although recent data suggests that Pre-med students taking this sequence perform better on MCAT exams. Physics uses mathematics extensively in analyzing the observable world around us. Among the goals of our introductory physics courses ( Physics 150 and 151 ) are for the students to see how the physical world can be described in mathematical terms and that the laws introduced to the students to describe the world around them can be used to make useful predictions about behavior in the physical universe.

Among the topics to be covered this semester are kinematics in one and two dimensions, the laws of motion, conservation of energy and momentum, gravitation, oscillations, and waves.

As we go through this course, I hope that it will become clear to you that **physics** **is not a** **collection of facts and equations to be memorized,** but a process ... **a way of thinking about the world around you and describing its behavior mathematically.**

**Lecture**: I will spend portions of our class time attempting to clarify and provide insight into course material using derivations, demonstrations, and numerical examples. **I will not lecture on** **all the material covered by our text, and occasionally, I may add additional material not covered in the text**. Because of this, **I highly suggest that you make it a practice to attend all lectures.**

**Recitations**: Recitations are 50 minute discussion periods in which **one or more challenging**

**problems** will be presented to illustrate concepts covered recently in lecture. To prepare for recitations, it is important that you **try** **ALL** **of the assigned problems from our text that I have chosen** relating to the material ahead of time. Answers to odd-numbered problems are given in the back of our text. I will post answers to the even-numbered problems and lecture example problems on **Canvas**. You **will only be allowed to use equation sheets during recitation work.**  Recitations will begin in the second week of classes.

**Laboratory**: Twelve laboratory experiments are scheduled. They will begin on Wednesday, September 11th. On-time attendance is required at all lab sessions. **There are** **no make-up labs**. The lab manual will be available online at my homepage. It is **YOUR** responsibility to print a copy of each experiment and read it carefully before coming to lab. Your lab reports will be completed during the 3-hour lab period, and will be graded by your lab professor on a 10-point maximum.

The laboratory portion of this course is important from the standpoint of learning proper lab procedures as well as beginning to learn how scientists and engineers organize experimental protocols and gather results in the testing of physical laws and relationships. As such, any students missing three **( 3 )** or more labs will receive a **ZERO** for the lab portion of their grade.

On occasion, illness or other complications may make it necessary for you to miss your scheduled lab section. It is permissible to attend occasionally another section under the following guidelines : **1)** Inform the lab instructor as soon as you enter the lab.

**2)** Complete your own separate lab write-up.

**3)** Have the lab instructor initial your write-up indicating your attendance.

**4)** Place your lab write-up in your professor’s mailbox in the NatSci office.

**EXAMS** **:** The purpose of exams is to find out what you understand and how well you understand it. There will be three term exams and a comprehensive final exam. The exam schedule is listed in the lecture schedule later in this syllabus. All exams are closed book. You are expected to take these exams at the scheduled time. If you are unable to take an exam at the scheduled time, prior arrangements must be made with me. A student **“suddenly incapacitated"** on an exam day will need **rigorous documentation** (i.e. - a written note from a doctor, hospital, or attendant). Students may prepare for exams in different ways, but two methods that I highly recommend are : **1)** prepare for several days by studying numerous times for short time intervals, and  **2)** study in groups regularly throughout the term will be invaluable preparation for exams.

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|  | **Term Exam Schedule** |  |
| **Exam I** | **Friday , October 11** | **4:30 - 6** **pm** , room tbd |
| **Exam II** | **Friday , November 15** | **4:30 – 6 pm** , room tbd |
| **Exam III** | **Friday , December 6** | **4:30 – 6 pm** , room tbd |

**Final Exam**: The final exam is scheduled for **Thursday , December 12th** from **8 – 11 am.** The room for the final exam is not yet determined.

**Calculators:** A simple scientific calculator (like Tl-30 series) may be used on all exams. Programmable calculators are not allowed, and all types of cell phones are forbidden. Violators will receive a zero on the exam.

**Drop Day:** The last day to drop this course is **Thursday, November 7th .**

**Students with Disabilities:** The University makes reasonable accommodations for students with documented disabilities. Students should register with **Disability Resource Services in UC.** Registration must be completed by the end of January.

**Academic Conduct:** The University values academic honesty and integrity very highly. Each student has a responsibility to understand, accept, and comply with the University's standards of academic conduct set forth in the Code of Academic Conduct, as well as policies established by the schools and colleges. All forms of cheating are considered serious offenses.

**A first cheating offense results in an automatic E in the course and a permanent note on the student's transcript.**

**Grades**: You will accumulate points based on your performance in the following categories:

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| **12 Labs** | **120 Points** |
| **Recitation Work** | **80 Points** |
| **3 Term Exams** | **300 Points** |
| **Final Exam** | **100 1Points** |
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| **TOTAL** | **600 Points** |

Final grades will be **earned** as follows:

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| **510 - 600** | **A** |
| **420 - 509** | **B** |
| **360 - 419** | **C** |
| **300 - 359** | **D** |

*\*Plus and minus grades will fall near the top and bottom of these categories and will be awarded at my discretion.*

**Supplemental Instruction ( SI ) :** The university has a very successful program in which students from previous classes of Physics 150 have regularly scheduled tutoring sessions for helping current students who might be having difficulties with portions of this course. The sessions are free and I encourage all of you to attend some of these sessions as your individual schedules permit. I will post the schedule for these SI sessions at a later date. **Data collected from previous terms clearly indicates that those who regularly attend these sessions attain higher grade averages than those who don’t.**

**Lecture Schedule**

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| **Date** | **Subject** | **Text Pages** |
| **Thurs - 9/5** | Introduction, Syllabus, Chapters 1,2 |  |
| **Tues - 9 / 10** | Chapter 2 : ( 1-d kinematics ) | Pages 13 - 30 |
| **Thurs - 9 / 12** | Chap. 3 : vectors + lec. examples | Pages 40 - 54 |
| **Tues - 9 / 17** | Kinematics in two dimensions | Pages 62 - 74 |
| **Thurs - 9 / 19** | Circular motions & lecture examples | Pages 75 - 81 |
| **Tues - 9 / 24** | Newton’s Laws of Motion | Pages 94 - 105 |
| **Thurs – 9 /26** | Applications of Newton’s Laws | Pages 106 - 114 |
| **Tues - 10 / 1** | Frictional Forces | Pages 124 - 132 |
| **Thurs - 10 / 3** | Centripetal Force and Lec. Examples | Pages 133 - 138 |
| **Tues - 10 / 8** | Work and Kinetic Energy | Pages 149 - 167 |
| **Thurs – 10 / 10** | Potential Energy and Conservation | Pages 177 - 190 |
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| **Friday – 10 /11** | **EXAM 1 ( Chapters 2 – 6 )** | **4:30 - 6:00 pm** |
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| **Tues - 10 / 15** | **No Classes – Study Day** |  |
| **Thurs – 10 / 17** | Conservation of Energy Continued | Pages 190 - 199 |
| **Tues - 10 / 22** | Chap. 9 – Impulse and Momentum | Pages 214 - 232 |
| **Thurs - 10/24** | Conservation of Linear Momentum | Pages 233 - 243 |
| **Tues - 10 / 29** | Angular Variables and Rotation | Pages 257 - 271 |
| **Thurs - 10/31** | Torque and Newton’s 2nd Law | Pages 271 - 284 |
| **Tues - 11 / 4** | Angular Momentum and Energy | Pages 295 - 305 |
| **Thur - 11 / 6** | Conservation of Angular Momentum | Pages 305 - 318 |
| **Tues - 11 / 11** | Chap. 13 - Universal Gravitation | Pages 354 - 368 |
| **Thurs - 11/13** | Orbits, Kepler, and Newton | Pages 368 - 377 |
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| **Friday – 11/15** | **Exam II (Chapters 7 – 11 )** | **4:30 - 6:00 pm** |
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| **Tues - 11 / 18** | Orbits and Kepler’s 3rd Law |  |
| **Thurs - 11/20** | Chap 15 : Simple Harmonic Motion | Pages 413 - 434 |
| **Tues - 11 / 25** | SHM and Ch. 16 : Waves | Pages 444 - 452 |
| **Thurs - 11/27** | **No Classes - Thanksgiving** |  |
| **Tues – 12 / 3** | Interference and Standing Waves | Pages 453 - 470 |
| **Thurs - 12 / 5** | Kinetic Theory of Gases | Pages 549 - 557 |
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| **Friday - 12/6** | **EXAM 3 Chapters 13,15,16,19** | **4:30 – 6:00 pm** |
| **Tues - 12 / 10** | **Grade sub-totals + Final Review** |  |
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| **Thurs 12 / 12** | **FINAL EXAM** | **8:00 – 11:00 am** |
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**Chapter Assignments: Laboratory Schedule:**

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| **Chapter 1:** | 1,3,9,22,27,37,42 |
| **Chapter 2:** | 15,18,19,25,30,53,72,73,90 |
| **Chapter 3:** | 9,18,20,30,35 |
| **Chapter 4:** | 23,28,43,56,67,77,108 |
| **Chapter 5:** | 10,20,31,33,39,50 |
| **Chapter 6:** | 20,23,28,41,43,57,77 |
| **Chapter 7:** | 8,9,15,17,31,36,49 |
| **Chapter 8:** | 3,6,16,22,42,54,57 |
| **Chapter 9:** | 2,12,25,27,40,52,74 |
| **Chapter 10:** | 11,23,35,45,52,61,95 |
| **Chapter 11:** | 10,11,37,38,51,58,60 |
| **Chapter 12:** |  |
| **Chapter 13:** | 8,10,24,45,48,51,62 |
| **Chapter 15:** | 3,6,9,11,17,31,33 |
| **Chapter 16:** | 5,10,16,21,41,58 |
| **Chapter 19:** | 3,6,9,13,18,22,25 |

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| **Date** | **Experiment** |
| **Sept. 11 / 12** | Constant Velocity |
| **Sept. 18 / 19** | Constant Accelerat. |
| **Sept. 25 / 26** | Projectile Motion |
| **Oct. 2 / 3** | Force and Motion I |
| **Oct. 9 / 10** | Force and Motion II |
| **Oct. 16 / 17** | Motion in Circles |
| **Oct. 23 / 24** | Energy |
| **Oct. 30 / 31** | Newton’s 3rd Law |
| **Nov. 6 / 7** | Rotational Motion |
| **Nov. 13 / 14** | Orbital Mechanics |
| **Nov. 20 / 21** | Simple Har. Motion |
| **Nov. 27 / 28** | **No Labs** |
| **Dec. 4 / 5** | Waves and Modes |
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**Dearborn Discovery Core Category :** Areas of Inquiry ( Natural Sciences )

**Dearborn Discovery Core Goals :** Physics 150 is a Natural Sciences Course in the Dearborn Discovery Core. The four expected learning outcomes for Natural Sciences Courses are:

1. Students are able to demonstrate an understanding of the nature of the scientific method including hands on practice.
2. Students are able to formulate and interpret testable questions that result in qualitative and quantitative data.
3. Students are able to apply unifying theories and laws to natural science disciplines and are able to explain examples.
4. Students are able to demonstrate the ability to interpret and communicate science and apply its relevance.