Physics 181: Physics for Scientists and Engineers II
Syllabus, Spring Semester, 2015

Instructor: Trevor Burris, Ph.D.  
Lecture: Tuesday and Thursday  
5:30 PM to 6:45 PM  
Office Hours: M, 10am-11am, TR, 4pm-5pm  
OSN 102 (Orvis Building)

Office: Leifson Physics (LP), Room 101

Course Description: PHYS 181 - Physics for Scientists and Engineers II (3 units)
Thermodynamic laws, kinetic theory, electric charge, field, potential, current, dielectrics, circuit elements, magnetic fields and materials, electromagnetic oscillations.
Prerequisite(s): MATH 182; PHYS 180.

SILVER Core Objective 4: Physical & Natural Phenomena
Students will be able to explain the processes by which the natural and physical world is investigated, articulate basic principles used to explain natural phenomena, and apply scientific processes to real problems using observational or experimental methods. Successful completion of PHYS 181 will partially satisfy Silver CO4.

Core Objective 4. The learning outcomes for this course are:
1. The student will demonstrate problem solving skills in various types of problems in physics using quantitative reasoning, critical thinking and appropriate mathematical techniques.
2. The student will demonstrate the ability of use scientific methods to understand and explain concepts in physics.
3. The student will be able to connect physics concepts and problems to their world experience.

Prerequisite: MATH 182 and PHYS 180
Calculator: A scientific graphing calculator is required.

Course Grade: Homework is worth 40% of the student’s overall grade.
Exams (3 total) are each worth 20% of the student’s overall grade.

Grade Scale:
A 93.0% to 100%,  A- 90.0% to 92.9%,  B+ 87.0% to 89.9%
B 83.0% to 86.9%,  B- 80.0% to 82.9%,  C+ 77.0% to 79.9%
C 73.0% to 76.9%,  C- 70.0% to 72.9%,  D+ 67.0% to 69.9%
D 63.0% to 66.9%,  D- 60.0% to 62.9%,  F Below 60%

Website: We will take advantage of online assignments from Web Assign. Please register at the below website with the following class key. Contact me if you have any trouble.

Web Address: www.webassign.com  
Class Key: unr 7305

Exams: All exams will be given in class, and you may use your own hand written notes
during each exam. You may not use printed or photocopied material.

Exam 1 --- Thursday, February 26, Thermodynamics, Ch 19 --- Ch 22
Exam 2 --- Thursday, April 9, Electrostatics and Electrodynamics, Ch 23 --- Ch 28
Exam 3 --- Tuesday, May 5, Magnetism, Ch 29 --- Ch 3

**Additional Resources:** Although I will do my best to keep lecture topics clear and understandable, you may find that you learn better from someone else's teaching style. Therefore, I expect you to work with other students from the class but not to copy. Even if you easily grasp a topic, help someone who's having trouble and reinforce your understanding. If you feel that you are falling behind, then let me know, and don't wait. Additionally, your student fees cover usage of the UNR Math Center (784-4433, www.unr.edu/mathcenter), the UNR Tutoring Center (784-6801, www.unr.edu/tutoring), and the University Writing Center (784-6030, http://www.unr.edu/writing-center). These centers support your classroom learning, and it's your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student, so visit these centers regularly.

**Disabilities:** Any student wishing to apply for academic accommodations or adjustments is requested to inform the instructor, or contact the Disability Resource Center (DRC, Thompson, Suite 101, Phone: 784-6000, Fax: 775-784-6955) directly and as soon as possible to arrange appropriate actions. The DRC will be able to answer any questions regarding accommodations or adjustments.

**Attendance:** It is to your benefit to attend each lecture. If an emergency arises and you cannot participate in an exam, please email me. Under certain emergency circumstances and with my approval, a student may be allowed to complete a make-up exam, but the student should be prepared to show documentation of why he or she was absent.

**Withdrawal:** The last date to drop classes and receive a "W" is March 31, 2015.
Audio and Video Recording: Surreptitious or covert videotaping of class and unauthorized audio recording of class are prohibited by law and by Board of Regents policy. This class may be videotaped and/or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may have been given permission to record class lectures and discussions. Therefore, students should understand that their comments during class might be recorded.

Academic Integrity: All examinations, homework, and quizzes must be your own work. Any act of plagiarism (cheating, piracy, theft, etc.) or otherwise obtaining grades under false pretenses constitutes academic dishonesty according to the code of this university. Academic dishonesty will not be tolerated and penalties can include canceling a student's enrollment without a grade, giving an F for the course or for the assignment. For more details, see the UNR General Catalog.

Distractions: Let's keep our lecture sessions effective for learning. A student that is causing distractions or using a cellular phone during class may be asked to leave and will receive a grade of zero for any resulting missed assignments.

If you ever have questions or comments, please don't hesitate to contact me at trevorb@unr.edu. I will check emails regularly. This syllabus is subject to change.
PHYS 181  
Course Calendar  
Spring 2015

Please read and watch videos about the following course topics, and try the homework problems related to them, before we discuss them in class.

Week 1 (1/20-1/23): Temperature, thermal equilibrium, 0th Law of Thermodynamics, phase changes, low-density gas thermometer, Kelvin temperature scale, ideal gas law, Avogadro’s number, kinetic theory. HW01-HW03.

Week 2 (1/26-1/30): RQ01 on MU45 due Tues  
1st Law of Thermodynamics, internal energy, heat. Kinetic theory, ideal gas law, equipartition of energy, RMS molecular speed, Maxwell-Boltzmann speed distribution. HW04-HW06.

Week 3 (2/02-2/06): RQ02 on MU46 due Tues  
Heat, calorimetry, specific heat, latent heat. Work done on/by a gas, P-V diagrams, isothermal, adiabatic, isobaric, isochoric, and cyclic processes. HW07-HW09.

Week 4 (2/09-2/13): RQ03 on MU47 due Tues  

Week 5 (2/16-2/20): Test 1a – Thermodynamics, Wednesday 2/18  
Refrigerators, irreversibility, entropy, thermal expansion. Electric charges, electric force, principle of superposition, Coulomb’s law. HW13-HW14.

Week 6 (2/23-2/27): RQ04 on MU28 due Tues  
Conductors, insulators, semiconductors, electrical ground. Electric fields, motion of charge in an electric field, electric field lines. Electric field of charges and continuous charge distributions. HW15-HW17.

Week 7 (3/02-3/06): RQ05 on MU29 due Tues  
Gauss’ law, electric flux. Electrostatic equilibrium, electrostatic shielding. Electrostatic potential energy, conservative forces, potential energy of two point charges. HW18-HW19.

Week 8 (3/09-3/13): RQ06 on MU30 due Tues  
 Electrostatic potential field, potential of point charges and continuous charge distributions, equipotential surfaces, contour maps, electric field from gradient of potential. HW20-HW22.

Week SB (3/16-3/20): Spring Break

Week 10 (3/30-4/03): **Test 2a – Electrostatics, Monday 3/30, Drop Deadline Tuesday 3/31**
Electric current, batteries, resistance. Ohm’s law, non-ohmic materials, electron drift speed, current density, conductivity, resistivity. Dependence of resistance on geometry, material, and temperature, resistors. *HW26-HW29.*

Week 11 (4/06-4/10): **RQ08 on MU33 due Tues**

*RQ09 on MU34 due Tues, RQ10 on MU35 due Sun**
Magnets, magnetic fields, magnetic field sources. Magnetic force on magnets, magnetic materials, moving charges, and electric currents. Motion of charges in a magnetic field. Wien velocity filter, cyclotron motion, magnetic torque on a current loop, magnetic dipole moment. Ammeters, loudspeakers, electric motors, electric generators, Hall effect. *HW32-HW33.*

Week 13 (4/20-4/24): **RQ11 on MU36 due Tues, RQ12 on MU37 due Sun**

Week 14 (4/27-5/01): **RQ13 on MU39 due Tues**
**Test 3a – Electricity & magnetism, Friday 5/01**

**Final: Reprise – Tests 1c, 2c, & 3b, Monday 5/11, 10:15am-12:15pm, SLH1**