Physics 1302W.500 Introductory Physics for Science and Engineering II (Spring 2014)

Instructor: Yong-Zhong Qian
Office: Physics 342C
E-mail: qian@physics.umn.edu E-mail should be used only for emergencies. For any other circumstance, please approach me after lecture or come to office hours.

Office Hours:
13:25–14:15 W; 11:15–12:05 Th or by appointment
Please try to come at the beginning of the office hours if you need help with a number of problems.

Class Times and Place:
Lecture: M Tu W 16:40–17:30 Physics 150
Quiz: F (Feb. 14, March 7, April 11, and May 2 only) 16:40–17:30 Physics 150
Final: May 15 (Th) 18:30–21:30 Room TBA
For all exams you will be allowed to use one (8.5 in x 11 in) crib sheet, prepared by the instructor, as well as one (nonprogrammable) calculator.

Required Textbook (available at the bookstore):
Paul A. Tipler and Gene Mosca:
Physics for Scientists and Engineers, 6th edition
(Chaps. 21–30)

Supplementary Textbooks:
Ayres & Mendelson (Schaum’s Outlines): Calculus
Morgan: Calculus Lite
Competent Problem Solver, UMN (posted)
Concerning physics, we will strictly follow the required textbook. The supplementary textbooks are a good reference if you think you need to do some more work for the math, or for solving the problems (the choice is up to you).

Class Webpage:
Choose 1302W.500 from http://www.physics.umn.edu/classes/phys/2014/spring/index.html. Please visit the class webpage regularly for official announcements regarding lectures, lab, homework, quizzes, and the final exam. Solutions to the quizzes will be posted here after they are graded. You must log in using your University X.500 Username and password.

Announcements:
We will make all efforts to follow the schedule presented in this syllabus. However, it is occasionally necessary to modify the course schedule, including the dates of quizzes. Students are responsible for receiving all announcements made during lectures, discussion or lab sessions. Important announcements will be posted on the class webpage. Missing an announcement is not an acceptable excuse for missing a quiz or a course-related deadline. It is the responsibility of any student missing a lecture, discussion or lab session to find out the course material covered and any announcements made.
Open-Door Policy:
If any difficulties or problems arise in this course that interfere in any way with your learning or optimum performance, please contact the instructor or your TAs. We will do our best to deal with problems promptly and effectively.

Discussion Sections and Laboratories:

<table>
<thead>
<tr>
<th>Sec.</th>
<th>Discussion</th>
<th>Room</th>
<th>Sec.</th>
<th>Lab</th>
<th>Room</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>503</td>
<td>15:35–16:25 Th</td>
<td>AmundH 162</td>
<td>504</td>
<td>17:45–19:40 W</td>
<td>Phys 154</td>
<td>C. Conklin</td>
</tr>
<tr>
<td>507</td>
<td>15:35–16:25 Th</td>
<td>Armory 116</td>
<td>508</td>
<td>08:00–09:55 Tu</td>
<td>Phys 153</td>
<td>C. Bao</td>
</tr>
<tr>
<td>522</td>
<td>16:40–17:30 Th</td>
<td>KoltH 139</td>
<td>523</td>
<td>14:30–16:25 Th</td>
<td>Phys 155</td>
<td>J. Garamella</td>
</tr>
<tr>
<td>524</td>
<td>16:40–17:30 Th</td>
<td>VinH 213</td>
<td>525</td>
<td>08:00–09:55 Tu</td>
<td>Phys 154</td>
<td>M. Li</td>
</tr>
<tr>
<td>528</td>
<td>16:40–17:30 Th</td>
<td>VinH 209</td>
<td>529</td>
<td>17:45–19:40 Th</td>
<td>Phys 154</td>
<td>C. Conklin</td>
</tr>
</tbody>
</table>

TA Office Hours in Physics 137:

<table>
<thead>
<tr>
<th>TA</th>
<th>E-mail</th>
<th>Office hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaoyun Bao</td>
<td><a href="mailto:bao@physics.umn.edu">bao@physics.umn.edu</a></td>
<td>15:35–16:25 Tu</td>
</tr>
<tr>
<td>Chris Conklin</td>
<td><a href="mailto:conklin@physics.umn.edu">conklin@physics.umn.edu</a></td>
<td>11:15–12:05 M</td>
</tr>
<tr>
<td>Jonathan Garamella</td>
<td><a href="mailto:garamella@physics.umn.edu">garamella@physics.umn.edu</a></td>
<td>09:05–09:55 Tu</td>
</tr>
<tr>
<td>Ming Li</td>
<td><a href="mailto:ml@physics.umn.edu">ml@physics.umn.edu</a></td>
<td>12:20–13:10 Th</td>
</tr>
<tr>
<td>Jiaming Zheng</td>
<td><a href="mailto:zheng@physics.umn.edu">zheng@physics.umn.edu</a></td>
<td>10:10–11:00 W</td>
</tr>
</tbody>
</table>

The Class:
This is the second semester of a two-semester introductory course in physics for science and engineering students. We will study Electricity & Magnetism. The reason that your major requires you to take this course is to prepare you for work in your chosen field by:

- Having a solid understanding of how the real world works based on a very small number of fundamental principles of physics
- Being able to solve complex problems by applying the fundamental principles of physics both qualitatively and quantitatively
- Being able to decide on the applicability of principles and techniques
- Communicating technical information in an organized and intelligible manner

The pace of this course should allow you to understand the material in depth, but it does move right along. **Don’t fall behind!** It is extremely difficult to catch up and the longer you leave it the harder it gets. While you use electricity every day, you may not be totally familiar with the physics involved. So, part of the material may seem rather abstract and mathematical. The way to counteract that is to actively participate from day one by thoroughly reading the textbook and the lab manual, by doing as many problems from the textbook as you can (think about the physics needed for those that you do not explicitly solve), and by making sure to get all your questions answered during office hours. We will require that you always use and communicate a logical and organized problem solving technique. What you get out of the course will depend on the productive effort and quality time you put into it; all the help you need is readily available!
Laboratory:
Because this course satisfies University requirements as a laboratory science class and as a writing intensive course, you must pass the laboratory (60% or more of the maximum possible points) to receive a passing grade in the course; note that your use of English and your grammar are important. The laboratory grade will be based on the demonstration of a well-organized and correctly-written technical communication of the physics concepts of this course in your laboratory journal and reports, well-thought-out predictions brought to class, and collaborative skills as evidenced by effective group work.

Grades for the laboratory work will be determined in part by laboratory reports (a total of 4, each for a different topic). The specific part of the laboratory for which you will write a report will be assigned to you by your TA at the end of the relevant laboratory topic. Reports should be about 4 typed pages (use of a word processor is encouraged and such facilities are supplied by the University) including all necessary predictions, graphs, data tables, and calculations. Reports must be given to your TA for grading within 1 week after they are assigned. Late reports will not be accepted. Graded reports will be returned to you no later than your next laboratory meeting. After the first lab report is returned to you, you will be allowed to revise it, to achieve a higher grade. The revised report needs to be turned in to your TA within two days. Only the first lab report can be revised. Details of the laboratory grading will be announced in lab.

Your TA will assign the lab problems a week ahead of time. All the laboratory problems have sections called Warm-up Questions. You are required to turn in the answers to these sections to your TA at least one day before the laboratory takes place. No one will be allowed to participate in the laboratory unless they have turned in their solutions to warm-up questions on time. Since the laboratory involves teamwork, you must attend all laboratory sessions and no laboratory makeup will be allowed except in situations officially recognized by the University. In that case, the laboratory work must be made up by arrangement with your TA before your next scheduled laboratory period.

In-class Response:
On average, you will be asked one multiple-choice question per lecture, to be answered with the electronic response system. Answering will give one point. Answering correctly will give two points. In many cases, it will be a simple question on something just explained on the same day. The student responder (iClicker2) should be acquired at the bookstore. To set up your clicker, register it online at http://www1.iclicker.com. Answer “No” to the moodle question, then enter your name, your student ID (not your X.500 ID), and the clicker code.

Quizzes:
Four quizzes will be given on the dates specified at the beginning of this syllabus. These quizzes will usually consist of 2 problems together with five multiple-choice questions and this will count for 75% of the quiz score. The remaining 25% of the score will come from a problem solved collaboratively by your group in the discussion session the day before. All group members get the same group score, but with the following exceptions: (1) The 10 minute rule — if you arrive for the group quiz more than 10 minutes late you cannot join your group and will have to do the quiz by yourself. (2) Those missing one discussion session during the preceding weeks will receive half the group score and those missing two sessions will receive zero score for the group quiz. We hope to return quizzes during the discussion session the following week. Solutions will be posted on the class webpage.
Homework:
Homework problems will be graded through the WebAssign system. Important: you need to create your homework WebAssign account in order to receive grades for your homework. To create the account:

1. Go to http://webassign.net
2. Select “I have a class key”
3. Enter the class key umn 7888 5479
4. Please use your U of M X.500 ID for Username. If you decide to register without paying now, you will be prompted to pay after a few weeks.
5. Use a credit card to pay WebAssign $35. Purchase on-line is cheaper.

The deadline for submitting homework into the WebAssign system is 4:40 pm Friday. For each question assigned, up to 5 attempts are allowed, and the system will inform you if your answer is correct as soon as you have entered it. Make sure that you do not accidentally modify a correct answer as the system will save the last answer given for each question. Each homework assignment will be available to you through the WebAssign system one week before the deadline.

Besides homework, you are strongly encouraged to work on the problems from the textbook, as many as possible — solving problems is by far the best way to learn the material in this course.

Grade:
The course grade will be determined from the various components of the course in the following way:
(a) The homework will count for 10%.
(b) The laboratory will count for 15%.
(c) In-class response will count for 5%.
(d) Each quiz will count for 12% of the score.
(e) The total grade will then be determined as the maximum over the following 5 possibilities:

1. Four quizzes at 12% each and final at 22%.
2. Three quizzes at 12% each and final at 34%.
3. Two quizzes at 12% each and final at 46%.
4. One quiz at 12% and final at 58%.
5. Zero quiz and final at 70%.

We will automatically assign you the highest grade obtained from these possibilities. This grading scheme allows you to not count a quiz that you missed or a quiz on which you did not perform well toward your final grade. The scheme also allows you not to take any quizzes and base your course grade heavily on the final exam — you are strongly encouraged to take the quizzes regularly: this is the best way to ensure your good progress in the class.

The letter grade for the course will be assigned according to the following approximate scale: A, A− (83–100), B+, B, B− (68–82), C+, C, C− (50–67), D+, D, D− (40–49), F (below 40 or a lab grade below 60%). The exact dividing lines will be determined only after the final exam is graded.
Tentative Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chap.</th>
<th>Lab (Suggested Problems)</th>
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</thead>
<tbody>
<tr>
<td>1 (1/21–24)</td>
<td>Electric Charge</td>
<td>21</td>
<td>Organizational</td>
</tr>
<tr>
<td>2 (1/27–31)</td>
<td>Electric Charge, Electric Field</td>
<td>21/22</td>
<td>Lab I 1, 2, 3 (Force)</td>
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<tr>
<td>3 (2/3–7)</td>
<td>Electric Field, Gauss’ Law</td>
<td>22</td>
<td>Lab I 4, 5 (CRT)</td>
</tr>
<tr>
<td>4 (2/10–14)</td>
<td>Gauss’ Law, Electric Potential</td>
<td>22/23</td>
<td>Lab II 1, 2 (EField) Q</td>
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<tr>
<td>6 (2/24–28)</td>
<td>Capacitance</td>
<td>24</td>
<td>Lab III 1, 2, 3 (Cap. and Energy)</td>
</tr>
<tr>
<td>7 (3/3–7)</td>
<td>Electric Currents (DC)</td>
<td>25</td>
<td>Lab IV 1, 2, 3 (Bulbs) Q</td>
</tr>
<tr>
<td>8 (3/10–14)</td>
<td>Electric Currents</td>
<td>25</td>
<td>Lab IV 8, 9, 11 (Resistors) LR</td>
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<tr>
<td>(3/17–21)</td>
<td><strong>Spring Break</strong></td>
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<tr>
<td>9 (3/24–28)</td>
<td>Magnetic Field &amp; Sources</td>
<td>26/27</td>
<td>Lab IV 4, 5 (RC)</td>
</tr>
<tr>
<td>10 (3/31–4/4)</td>
<td>Magnetic Field &amp; Sources</td>
<td>26/27</td>
<td>Lab V 1, 3 (Magnets) LR</td>
</tr>
<tr>
<td>11 (4/7–11)</td>
<td>Magnetic Induction</td>
<td>27/28</td>
<td>Lab V 2, 5 (Wire and Coil) Q</td>
</tr>
<tr>
<td>12 (4/14–18)</td>
<td>Magnetic Indct., Magnetism</td>
<td>28</td>
<td>Lab V 6, 7, 8 (Helmholtz, Force)</td>
</tr>
<tr>
<td>13 (4/21–25)</td>
<td>Inductance</td>
<td>28</td>
<td>Lab VI 3, 4 (Lenz, Induc.)</td>
</tr>
<tr>
<td>14 (4/28–5/2)</td>
<td>Alternating Currents</td>
<td>29</td>
<td>Lab VI 5, 6 (Generator, Time Vary) Q</td>
</tr>
<tr>
<td>15 (5/5–9)</td>
<td>Maxwell’s Equations</td>
<td>30</td>
<td>LR</td>
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LR = Lab report due; Q = Quiz. There may be changes in the above schedule depending on the actual pace of the course.
**Liberal Education:**
The class exposes the student to physical principles and concepts, demonstrates how these principles can be applied to quantitatively describe natural phenomena, and provides the student with an opportunity to perform hands-on experiments and measurements that model how physical knowledge is obtained. The fundamental principles of electricity and magnetism are explored and the application of these physics concepts in modern technology is emphasized. The development of conceptual understanding of physical principles and their quantitative application are further deepened in the discussion section, where students practice problem solving skills. In addition, familiarity with the methods and findings of the physical sciences not only forms a crucial component of a common education, but also prepares students to be scientifically literate citizens.

Because all knowledge in the physical sciences is empirically acquired, the laboratory component of the course is essential to properly expose students to the scientific method and the ways of knowing and thinking in the physical sciences. The lab component involves the formulation of scientifically sound predictions by the student, followed by empirical testing of the hypotheses through hands-on experimentation. Since the language of the physical world is mathematical, quantitative analysis of experimental data is an essential aspect of the lab experience. Physics, like all sciences, is a social endeavor, and students are exposed to cooperative problem solving, working in small groups with other students, in both the laboratory and discussion sections of the course.

**Departamental Policies:**
Athletes must provide their official University of Minnesota athletic letter containing the approved competition schedule to their instructor and the staff in office 148. Away exams will be arranged with the athletic adviser traveling with the team. Accommodations will be made for official university sports only (i.e. no accommodations will be made for intramurals, club sports, etc.).

Disability Services: If you have accommodations for this course, please provide the staff in office 148 with a copy of your accommodation letter for the current semester. Exams will be arranged according to accommodations and sent to the testing center for administration.

**Student Conduct Code:**
The University seeks an environment that promotes academic achievement and integrity, that is protective of free inquiry, and that serves the educational mission of the University. Similarly, the University seeks a community that is free from violence, threats, and intimidation; that is respectful of the rights, opportunities, and welfare of students, faculty, staff, and guests of the University; and that does not threaten the physical or mental health or safety of members of the University community.

As a student at the University you are expected to adhere to Board of Regents Policy: *Student Conduct Code*. To review the Student Conduct Code, please see: [http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf](http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf).

Note that the conduct code specifically addresses disruptive classroom conduct, which means “engaging in behavior that substantially or repeatedly interrupts either the instructor’s ability to teach or student learning. The classroom extends to any setting where a student is engaged in work toward academic credit or satisfaction of program-based requirements or related activities.”
Scholastic Dishonesty:
You are expected to do your own academic work and cite sources as necessary. Failing to do so is scholastic dishonesty. Scholastic dishonesty means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis. (Student Conduct Code: http://regents.umn.edu/sites/default/files/policies/Student_Conduct_Code.pdf)
If it is determined that a student has cheated, he or she may be given an “F” or an “N” for the course, and may face additional sanctions from the University. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/INSTRUCTORRESP.html.

The Office for Student Conduct and Academic Integrity has compiled a useful list of Frequently Asked Questions pertaining to scholastic dishonesty: http://www1.umn.edu/oscai/integrity/student/index.html. If you have additional questions, please clarify with your instructor for the course. Your instructor can respond to your specific questions regarding what would constitute scholastic dishonesty in the context of a particular class, e.g., whether collaboration on assignments is permitted, requirements and methods for citing sources, if electronic aids are permitted or prohibited during an exam.

Disability Accommodations:
The University of Minnesota is committed to providing equitable access to learning opportunities for all students. Disability Services (DS) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please contact DS at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations.

If you are registered with DS and have a current letter requesting reasonable accommodations, please contact your instructor as early in the semester as possible to discuss how the accommodations will be applied in the course.

For more information, please see the DS website, https://diversity.umn.edu/disability/.

Use of Personal Electronic Devices in the Classroom:
Using personal electronic devices in the classroom setting can hinder instruction and learning, not only for the student using the device but also for other students in the class. To this end, the University establishes the right of each faculty member to determine if and how personal electronic devices are allowed to be used in the classroom. For complete information, please refer to: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

Makeup Work for Legitimate Absences:
Students will not be penalized for absence during the semester due to unavoidable or legitimate circumstances. Such circumstances include verified illness, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, and religious observances. Such circumstances do not include voting in local, state, or national elections. For complete information, please see: http://policy.umn.edu/Policies/Education/Education/MAKEUPWORK.html.
Appropriate Student Use of Class Notes and Course Materials:
Taking notes is a means of recording information but more importantly of personally absorbing and integrating the educational experience. However, broadly disseminating class notes beyond the classroom community or accepting compensation for taking and distributing classroom notes undermines instructor interests in their intellectual work product while not substantially furthering instructor and student interests in effective learning. Such actions violate shared norms and standards of the academic community. For additional information, please see: http://policy.umn.edu/Policies/Education/Education/STUDENTRESP.html.

Grading and Transcripts:
Please see http://policy.umn.edu/Policies/Education/Education/GRADINGTRANSCRIPTS.html.

Sexual Harassment:
“Sexual harassment” means unwelcome sexual advances, requests for sexual favors, and/or other verbal or physical conduct of a sexual nature. Such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or creating an intimidating, hostile, or offensive working or academic environment in any University activity or program. Such behavior is not acceptable in the University setting. For additional information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/SexHarassment.pdf.

Equity, Diversity, Equal Opportunity, and Affirmative Action:
The University provides equal access to and opportunity in its programs and facilities, without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression. For more information, please consult Board of Regents Policy: http://regents.umn.edu/sites/default/files/policies/Equity_Diversity_EO_AA.pdf.

Mental Health and Stress Management:
As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance and may reduce your ability to participate in daily activities. University of Minnesota services are available to assist you. You can learn more about the broad range of confidential mental health services available on campus via the Student Mental Health Website: http://www.mentalhealth.umn.edu.