Physics 2303.001 – Physics III: Physics of Matter (Spring 2016)

Instructor: Vuk Mandic (Office: 328 PAN, Phone: 612-624-6844)
E-Mail is not an effective communication tool for this class. Please approach me after lecture or come to office hours.
Office Hours: M 11am-12pm in 328 PAN

Class Times and Place:
Lecture: M Tu W 14:30–15:20, Anderson 210
Exceptions: We will have lectures on Fridays (14:30–15:20) if necessary to make up cancelled classes.
The instructor will be away on Feb 1-4, so we will have make up lectures on 01/22, 01/29 and 02/05.
Quizzes: Three problem solving quizzes are scheduled for Fridays: February 12, March 11, and April 15. The quizzes will take place in Anderson 210 (A-N) and Anderson 230 (O-Z).
Final: Wednesday, May 11 2016, 8:30am - 11:30am. Location TBD.
For all exams you will be allowed to prepare and use one (8.5 in x 11 in) crib sheet, as well as one (nonprogrammable) calculator.

TA Office Hours: Olesya Koroteeva, koro0032@umn.edu, Tuesdays at 4-5pm, in PAN 334.
Kyle Greene, gree0583@umn.edu, Tuesdays 5-6pm, in the lobby (interaction area) on the 3rd floor of PAN (west end of the building).

Required Textbooks:
For the first half of the semester we will use the following two books: Tipler and Mosca, Physics for Scientists and Engineers, volume 1 and volume 2, 6th edition. These books were used in Ph1301 and Ph1302, so many of you should already have them (they are also available on amazon.com).
For the second half of the semester, we will use Tipler and Mosca Physics for Scientists and Engineers, volume 3. Also available on amazon.com.

Supplementary Textbooks:
Tipler and Llewellyn, Modern Physics , 6th edition
Fishbane, Gasiorowicz, and Thornton, Physics for Scientists and Engineers

Class Webpage (go to http://www.physics.umn.edu/classes/ and choose 2303.100):
Please visit the class webpage regularly for official announcements regarding lectures, 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.

Responsibilities:
The University of Minnesota assumes that all students enroll in its programs with a serious learning purpose and expects them to be responsible individuals who demand of themselves high standards of honesty and personal conduct. All students are expected to behave at all times with respect and courtesy toward their fellow students and instructors, and are expected to have the highest standards of honesty and integrity in their academic performance. Any behavior which disrupts the classroom learning environment or any attempt to present work that the student has not actually prepared as their own work, or to pass an examination by improper means, is regarded as a serious offense which may result in the expulsion of the student from the University. The minimum penalty for such an
offense is a failing grade for this course. Aiding and abetting the above behavior is also considered a serious offense resulting in equally severe penalties.

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 the TA. We will do our best to deal with problems promptly and effectively.

The Class:
This is the third semester of the introductory physics course sequence, focusing on modern physics. This course will provide you with:

- 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. Furthermore, parts 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 textbooks, 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!

Quizzes:
Three quizzes will be given on the Fridays specified at the beginning of this syllabus. These quizzes will usually consist of 3 problems. We hope to return quizzes during the following week in lecture. Solutions will be posted on the class webpage.

Homework:
Each week we will post several suggested textbook problems on the class website, five of which will be assigned as homework. Homework will count for 15% of the final grade for the course. You will need to submit solutions to these five problems in lecture on Wednesdays. They will be graded and returned in lecture the following week. Solutions to all textbook problems will be posted on the class website after the problems have been graded. Finally, at least one of the problems in each quiz will be similar to one of the suggested problems. 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. You are also encouraged to approach TA or the instructor if you need help with solving problems.

Grade:
The course grade will be determined from the various components of the course in the following way:
(a) Homework will count for 15%.
(b) Each quiz will count for 15% of the score.
(c) The total grade will then be determined as the maximum over the following 4 possibilities:

1. Three quizzes at 15% each and final at 40%.
2. Two quizzes at 15% each and final at 55%.
3. One quiz at 15% and final at 70%.
4. Zero quizzes and final at 85%.

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 final 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). The exact
dividing lines will be determined later.

Tentative Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Ch.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ideal Gas Law, Heat</td>
<td>TM17,18</td>
</tr>
<tr>
<td>2</td>
<td>1st and 2nd Law</td>
<td>TM18,19</td>
</tr>
<tr>
<td>3</td>
<td>Waves</td>
<td>TM15,16</td>
</tr>
<tr>
<td>4</td>
<td>EM Waves and Light</td>
<td>TM31</td>
</tr>
<tr>
<td>5</td>
<td>Mirrors and Lenses</td>
<td>TM32</td>
</tr>
<tr>
<td>6</td>
<td>Interference and Diffraction</td>
<td>TM33</td>
</tr>
<tr>
<td>7</td>
<td>Relativity: space and time</td>
<td>TM-R, TM39; TL1 and TL2</td>
</tr>
<tr>
<td>8</td>
<td>Relativity: energy and momentum</td>
<td>TM-R, TM39; TL1 and TL2</td>
</tr>
<tr>
<td>9</td>
<td>Quantization, Nuclear Atom</td>
<td>TM34; TL3,4</td>
</tr>
<tr>
<td>10</td>
<td>Wavelike Properties of Matter</td>
<td>TM34; TL5</td>
</tr>
<tr>
<td>11</td>
<td>Schrodinger Equation, 1D</td>
<td>TM35; TL6</td>
</tr>
<tr>
<td>12</td>
<td>Atomic Physics</td>
<td>TM36; TL7</td>
</tr>
<tr>
<td>13</td>
<td>Atomic Physics</td>
<td>TM36; TL7</td>
</tr>
<tr>
<td>14</td>
<td>Solid State</td>
<td>TM38; TL8,10</td>
</tr>
<tr>
<td>15</td>
<td>Selected Topics</td>
<td>TBD</td>
</tr>
</tbody>
</table>

How to do well in this course:

- Come to class regularly.
- Read/scan the relevant chapter before coming to class, and re-read it closely after the class.
- Participate actively and be involved in class discussions. Don’t be afraid to ask questions,
even if you think they are ”stupid” - chances are, many others in the class will have the same
question, so this will benefit them as well. It is by asking questions that we truly learn!
- Do the problems, as many as possible. This is by far the best way to learn the material in this
course!
- Keep up, don’t fall behind! We will move quickly through various topics, so it is critical that you keep up with reading and with homework problems.

- Do not approach the course through memorization: it is much more important to understand underlying concepts than to memorize various formulae!

**DEPARTMENTAL 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.

**MANDATORY POLICY INFORMATION:**

**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 adhere to Board of Regents Policy: Student Conduct Code. To review the Student Conduct Code, please see: http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html. 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://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.html)

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 is committed to providing quality education to all students regardless of ability. Determining appropriate disability accommodations is a collaborative process. You as a student must register with Disability Services and provide documentation of your disability. The course instructor must provide information regarding a course’s content, methods, and essential components. The combination of this information will be used by Disability Services to determine appropriate accommodations for a particular student in a particular course. For more information, please reference Disability Services:

**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 reference:
http://policy.umn.edu/Policies/Education/Education/CLASSROOMPED.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/CLASSNOTESSTUDENTS.html.

**Grading and Transcripts**
The University utilizes plus and minus grading on a 4.000 cumulative grade point scale in accordance with the following:
<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>4.000</td>
<td>Represents achievement that is outstanding relative to the level necessary to meet course requirements</td>
</tr>
<tr>
<td>A-</td>
<td>3.667</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>3.333</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>3.000</td>
<td>Represents achievement that is significantly above the level necessary to meet course requirements</td>
</tr>
<tr>
<td>B-</td>
<td>2.667</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>2.333</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2.000</td>
<td>Represents achievement that meets the course requirements in every respect</td>
</tr>
<tr>
<td>C-</td>
<td>1.667</td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>1.333</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1.000</td>
<td>Represents achievement that is worthy of credit even though it fails to meet fully the course requirements</td>
</tr>
<tr>
<td>S</td>
<td></td>
<td>Represents achievement that is satisfactory, which is equivalent to a C- or better.</td>
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</table>

For additional information, please refer to: 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://www1.umn.edu/regents/policies/humanresources/SexHarassment.html

**Equity, Diversity, Equal Opportunity, and Affirmative Action**
The University will provide 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://www1.umn.edu/regents/policies/administrative/Equity_Diversity_EO_AA.html

**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.