

FOUNDATIONS OF PHYSICS II (PHYSICS 352) WINTER 2019	PROFESSOR RAGHUVeer PARTHASARATHY PROFESSOR JAYSON PAULOSE
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SYLLABUS

Welcome to Physics 352! This syllabus has a lot of detail on many components of the course that we've constructed to help you learn, and to make the term run smoothly. Don't memorize it, but do read it. – Profs. Parthasarathy and Paulose

INSTRUCTORS AND LOGISTICAL INFORMATION

CLASS TIMES	MWRF 10:00-10:50 am, 110 Willamette <i>Attendance is not required, but is very strongly recommended.</i>
INSTRUCTORS	Professor Raghuvēer Parthasarathy (Par-tha-sa-ra-thē) Office: 362 Willamette Hall, Email: raghu@uoregon.edu Professor Jayson Paulose Office: 454 Willamette Hall, Email: jpaulose@uoregon.edu
TEACHING ASSISTANTS	This course has 1.5 graduate student teaching fellows (GTFs): [1.0] Rachel Klaiss (rklaiss@uoregon.edu) [0.5] Kent Mastroianni (kentmastro@gmail.com)
OFFICE HOURS	Prof. Parthasarathy: Thursday 12:00-12:50pm, Willamette 362 Prof. Paulose: Friday 1:30-2:20pm, Willamette 454 GTF: Rachel Klaiss Thursday 1:00-1:50 pm, Fri. 3:00-3:50, Willamette 76 GTF: Kent Mastroianni Wednesday 4:00-4:50, Klamath 103B <i>Office hour times may change, both by request (if particular times are not good for many students) and due to scheduling conflicts that arise.</i> Make use of office hours! Even if you don't have specific questions, feel free to drop by and chat about course topics.
EMAIL	Email: You can certainly ask questions of the professors and the teaching assistant by email! We will usually respond within 24 hours. We rarely respond to emails that begin "Hey..." or are otherwise poorly constructed. You can address us as "Prof. Parthasarathy" and "Prof. Paulose."

COURSE DESCRIPTION AND MATERIALS

TOPICS AND AIMS

Physics 352 and Physics 353 cover Statistical Mechanics and Thermodynamics. Statistical Mechanics deals with the properties of many-body systems – gases in a star, electrons in a metal,

molecules in a soap film – and reveals how “simple” properties such as temperature and phases of matter emerge from seemingly overwhelming complexity. Statistical mechanics is extremely useful not only within physics, but also beyond, and we’ll see in the course connections to chemistry, biology, information theory, and more. Thermodynamics deals with thermal energy, and can be considered a topic in itself, but becomes much clearer and more powerful if thought of as a subset of statistical mechanics. Of all the “core” topics in physics (the others being mechanics, electromagnetism, and quantum mechanics), we and many others find statistical mechanics to be the most fascinating! In case you’d like to see how Physics 352-3 fit into the overall learning objectives of the Physics major, please see <https://provost.uoregon.edu/sites/provost2.uoregon.edu/files/phys-learning-outcomes.pdf>.

Other goals: We will develop reasoning and problem-solving skills. The problems encountered in this course are less transparent than those in introductory courses, and tackling them helps us practice and expand our analytic abilities. An even broader aim of the entire Physics 351-3 series is to enable students to understand some of the issues and excitement of contemporary scientific research; we’ll apply this directly in the “Colloquium” exercise for the course. You’ll hopefully find, having explored optics and statistical mechanics, that doorways to a large fraction of current-day science are open to you.

Topics

- Brownian motion
- A first look at energy, ideal gases, and macroscopic phenomena (Chapter 1 of Schroeder)
- The Second Law of Thermodynamics (Chapter 2 of Schroeder)
- Interactions: temperature, pressure, and chemical potential (Chapter 3 of Schroeder)
- Boltzmann Statistics (parts of Chapter 6 of Schroeder)
- Free Energy (parts of Chapter 5 of Schroeder)
- Engines and Refrigerators (parts of Chapter 4 of Schroeder)

TEXTBOOK	<p>[Required] <i>An Introduction to Thermal Physics</i> by Daniel V. Schroeder This book will also be used in Physics 353 (taught by Prof. Eric Corwin). Other books you might find useful:</p> <ul style="list-style-type: none"> • <i>Thermal Physics</i> by Charles Kittel and Herbert Kroemer • <i>Molecular Driving Forces</i> by Ken A. Dill and Sarina Bromberg <p>A copy of the Schroeder book is on 90m reserve at the Science Library.</p>
CANVAS	<p>We will be using Canvas in this course to distribute course materials, and also for online assignments. URL: https://canvas.uoregon.edu/</p>

ASSIGNMENTS AND ASSESSMENTS

READING QUIZZES	<p>Reading assignments will precede many classes and will often have required “reading quizzes” associated with them. The reading quizzes will be assigned via Canvas and will be due 1 hour before the start of class. The</p>
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	<p>reading quizzes are “open book” – i.e. you can look back at the text – but we strongly suggest first trying mentally to answer each question without consulting the book, to develop and assess your understanding.</p> <p><i>Missed Reading Quizzes.</i> We anticipate that people may miss a few classes due to illness or other unanticipated events, and we also anticipate that a few of the reading quiz questions will be unclear. We will therefore re-scale the reading quiz scores so that 90% becomes 100% (with a ceiling of 100%).</p> <p><i>Requiring minimum score.</i> The reading quizzes count for a small fraction of the overall grade, but keeping up with readings will help elevate the level of in-class discussion for everyone. Therefore, we will incentivize this by setting at the end of the term any overall reading quiz score below 50% (before re-scaling) to zero, i.e. requiring a minimum reading quiz score of 50%.</p>
QUIZZES	<p>There will be short quizzes nearly every week, on Fridays. We’ll use these to assess understanding of key points without the heavy weight of an exam. The quizzes will also revisit homework problems. Each student’s lowest quiz score will be dropped from the overall total. There won’t be any make-up quizzes; if you miss one, this will be the quiz dropped from your overall grade calculation.</p>
HOMEWORK	<p>Homework is perhaps the most important part of the course (though not the easiest to assess). You’ll learn a lot by doing and thinking about the homework problems. There will be homework assignments approximately every week. You are encouraged to discuss the questions with others, but of course, <i>the work you submit should be your own</i>. Solutions will be posted – study these. <u>No late homework will be accepted.</u> Each student’s lowest score will be dropped from the overall calculation of the homework grade.</p>
EXAMS	<p>There will be one midterm exam, tentatively scheduled for Feb. 4, and a final exam on Tuesday, March 19, 10:15 am - 12:15 pm.</p>
GRADING	<p>The various grade components and their weights for the final grade are:</p> <ul style="list-style-type: none"> • <i>Quizzes: 15%</i> • <i>Reading Quizzes: 5%</i> • <i>Homework Assignments: 20%</i> • <i>Colloquium Report: 5%</i> • <i>Midterm Exam: 25%</i> • <i>Final Exam: 30%</i> <p>Overall Grade: A=88-100%; B=76-87.9%; C=64-75.9%; D=55-63.9%; F<55%.</p>
ABSENCES	<p>Students with a serious and well-documented reason for missing an exam should contact Profs. Parthasarathy and Paulose. Please see the descriptions of quizzes and reading quizzes for policies on missing any of those.</p>
HOW TO DO	<p>Plan ahead and start early! This applies to everything in the course –</p>

<p>WELL IN THE COURSE</p>	<p>homework, reading assignments, and general studying. It will be crucial to keep up with the course and not fall behind; later topics build on earlier ones. Homework assignments especially will require considerable time spent <i>thinking</i> – the majority of your learning will come from this.</p> <p>Make use of resources. If you have questions about lectures, assignments, readings, or other matters, come to Prof. Paulose’s, Prof. Parthasarathy’s, or the GTFs’ office hours with questions! Also, we encourage communication by phone or email, though we may often reply that it’s more effective to chat in person, at office hours.</p> <p><i>Also: Sleep! Many studies show that sleeping helps memory and understanding.</i></p>
<p>MISSED DEADLINES, SIGNIFICANT ABSENCES & INCOMPLETES</p>	<p>Only the following unforeseen and uncontrollable emergency situations are acceptable excuses for missed deadlines:</p> <ul style="list-style-type: none"> • Documented serious illness/injury; • Documented death in the <i>immediate</i> family. <p>All of the following are unacceptable – note that they include “personal” as well as “technological” excuses:</p> <ul style="list-style-type: none"> • Special occasions (e.g. weddings, birthdays, anniversaries etc.). • Work and school conflicts: “I had to work extra hours,” “I have a huge midterm tomorrow in another class...” • Couldn’t get to campus (alarm didn’t ring; missed the bus; etc.). • Being generally “busy” or having “a lot going on right now...” • Forgot or “mixed up” the assignment or due date. <p>No access to computer or printer; assignment completed on computer is “missing,” was accidentally erased, or is inaccessible.</p>
<p>ACADEMIC INTEGRITY</p>	<p>All students will be expected to adhere to the University’s guidelines on academic integrity as outlined in the Student Conduct Code: https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code. As detailed in the policy, academic misconduct means the violation of university policy involving academic integrity. This includes cheating (“any act of deception by which a student misrepresents or misleadingly demonstrates that the student has mastered information on an academic exercise that the student has not mastered”), and plagiarism (“using the ideas or writings of another as one’s own.”) The instructor has a zero tolerance policy for academic dishonesty. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.</p>
<p>CAMPUS RESOURCES TO SUPPORT LEARNING</p>	<p><i>Tutoring and Academic Engagement Center</i> (https://engage.uoregon.edu/services/) Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, engage@uoregon.edu.</p>

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center(541)346-3227

Accessible Education Center The University of Oregon is working to create inclusive learning environments. The instructor believes strongly in creating inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoac@uoregon.edu

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu

The *UO Access Shuttle* is an on-campus ride service provided at no cost to students with conditions that limit mobility. More information and a sign-up form can be found on the parking & transportation department website: <https://parking.uoregon.edu/content/access-shuttle>.