Introduction to Modern Physics
PHYS 3305 001
Physics Department
Fall 2022

Instructor Information

Instructor: Joel Meyers
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Faculty Website: https://joelmeyers.github.io/
Phone Number: 214-768-1048
Office Location: FOSC 209
Office Hours:
Mondays 10:00-11:00 AM, Wednesdays 12:00-1:00 PM, or by appointment
Preferred Method of Contact:
Email

Course Details

Location: FOSC0158
Meeting Dates and Times:

08/22/2022	12/05/2022	12:30:00 PM	01:50:00 PM
08/22/2022	12/05/2022	12:30:00 PM	01:50:00 PM
08/22/2022	12/05/2022	12:30:00 PM	01:50:00 PM

Credit Hours: 3.00
Course Description: For science and engineering majors. Covers special relativity, elements of quantum physics, structure of atoms, molecules and solids, nuclear physics, and elementary particles. Prerequisite: PHYS 1304 or PHYS 1308.

Student Learning Outcomes

Students will be able to research, compile and present an assigned topic in the field of Modern Physics.

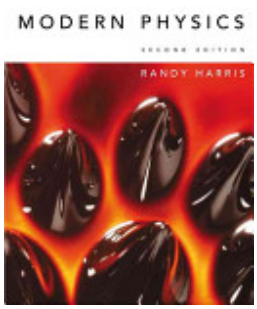
Upon successful completion of this course, students will be able to:

1. Explain why relativity and quantum mechanics and are needed to explain natural phenomena that are central to the modern world;
2. Apply their understanding of relativity and quantum mechanics to a range of problems that occur in areas as diverse as medicine, communication and computation;
3. Demonstrate the basic understanding of relativity, quantum mechanics and statistical mechanics required to pursue more advanced topics in each of these related areas.

Common Curriculum

CC - Oral Communication,2016 Information Literacy,CC - Oral Communication

Required Texts and Materials



Modern Physics
ISBN: 9780805303087
Authors: Randy Harris
Publisher: Addison-Wesley Longman
Publication Date: 2008-01-01

Grading Policies/Grading Scale

Grade Breakdown

Homework	25%
Reading Quizzes	10%
Presentation	15%
Midterm Exams	30% (15% each)
Final Exam	20%

Grading Scale

A	93-100
A-	90-93
B+	87-90
B	83-87

B-	80-83
C+	77-80
C	73-77
C-	70-73
D+	67-70
D	63-67
D-	60-63
F	0-60

Final grades are earned based on the table above without rounding, e.g. a cumulative score of 82.95 would earn a final grade of B-.

Assignment Group Descriptions

Homework (25% of final grade)

- Homework will be assigned most weeks. You are encouraged to work through problems with your peers, but each student must submit independently prepared solutions. It is essential that you show your work and prepare solutions in a clear, logical manner. Completed assignments will be submitted electronically via Canvas. No late homework will be accepted without prior arrangement.

Reading Quizzes (10% of final grade)

- Short quizzes must be completed on Canvas before each class period. The quizzes will cover material that you should read before coming to class in order to prepare for in-class activities. No late submissions will be accepted. Your two lowest quiz grades (including unexcused missing quizzes) will be dropped.

Presentation (15% of final grade)

- You will be asked to prepare and deliver a short presentation on an instructor-approved topic of your choosing related to modern physics. A list of suggested topics and more detailed guidelines will be provided in the latter half of the semester.

Midterm Exams (30% of final grade, 15% each)

- There will be two in-class midterm exams on September 29 and November 10 (dates to be confirmed). You will be allowed one hand-written letter-sized page of notes and a scientific calculator, but the exams will otherwise be closed-book.

Final Exam (20% of final grade)

- A comprehensive final exam will be held Monday December 12, 11:30 AM - 2:30 PM. You will be allowed two hand-written letter-sized pages of notes and a scientific calculator, but the exam will otherwise be closed-book.

Course Schedule

Date	Topic	Chapter (Harris Textbook)
August 23	Intro, Pre-Modern Physics	Chapter 1
August 25	Special Relativity	Chapter 2
August 30	Special Relativity	Chapter 2
September 1	Special Relativity	Chapter 2
September 6	Electromagnetic Waves as Particles	Chapter 3
September 8	Electromagnetic Waves as Particles	Chapter 3
September 13	Matter as Waves	Chapter 4
September 15	Matter as Waves (Asynchronous)	Chapter 4
September 20	Bound States	Chapter 5
September 22	Bound States	Chapter 5
September 27	Unbound States	Chapter 6
September 29	**Midterm Exam 1**	Chapters 1-5
October 4	Unbound States	Chapter 6
October 6	Hydrogen Atom	Chapter 7
October 11	**Fall Break - No Class**	
October 13	Hydrogen Atom	Chapter 7
October 18	Spin	Chapter 8
October 20	Spin	Chapter 8
October 25	Statistical Mechanics	Chapter 9
October 27	Statistical Mechanics	Chapter 9
November 1	Molecules and Solids	Chapter 10
November 3	Molecules and Solids	Chapter 10
November 8	Nuclear Physics	Chapter 11
November 10	**Midterm Exam 2**	Chapters 6-10

November 15	Nuclear Physics	Chapter 11
November 17	Particles and Interactions	Chapter 12
November 22	Particles and Interactions	Chapter 12
November 24	**Thanksgiving - No Class**	
November 29	Special Topics	
December 1	Special Topics	
December 12	**Final Exam**	Comprehensive

The draft schedule above should be taken as a rough approximation of the timeline for the course, though the details and pace are likely to deviate from what is shown here.

Communication and Response Times

Email is generally the best way to reach me outside of class. I will typically respond to emails within 24 hours (and often much faster) during weekdays. Arrangements for in-person or remote meetings can be made via email. Written work will typically be graded within one week of submission.

Course Policies

Homework Preparation and Submission

Submitted assignments need to be clear, legible, and organized in order to ensure that you receive proper credit for your work. You should show the steps you took to arrive at your answers in a manner that is easy for others to follow. Be sure to include units where appropriate, and use the correct number significant figures in your final answer. Each submitted assignment should include:

- Your name
- The assignment name (e.g. Homework 3)
- Clearly labeled problem identifiers associated with each solution (e.g. Problem 4.5)
- Boxed final answers, where appropriate

I strongly recommend use of a smartphone app (there are many free, quality options available) to create PDF versions of written work to be submitted electronically.

Academic Honesty and Integrity

While you are encouraged to work with your peers on homework, each student must prepare their own work for submission. Conduct in this course is expected to adhere to the University

Honor Code, spelled out in the Student Handbook (https://www.smu.edu/StudentAffairs/officeofthedeanofstudents/StudentHandbook).

Title IX and Disability Accommodations

Disability Accommodations

Students who need academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit smu.edu/DASS to begin the process. Once they are registered and approved, students then submit a DASS Accommodation Letter through the electronic portal, *DASS Link*, and then communicate directly with each of their instructors to make appropriate arrangements. Please note that accommodations are not retroactive, but rather require advance notice in order to implement.

Sexual Harassment

All forms of sexual harassment, including sexual assault, dating violence, domestic violence and stalking, are violations of SMU's Title IX Sexual Harassment Policy and may also violate Texas law. Students who wish to file a complaint or to receive more information about the grievance process may contact Samantha Thomas, SMU's Title IX Coordinator, at accessequity@smu.edu or 214-768-3601. Please note that faculty and staff are mandatory reporters. If students notify faculty or staff of sexual harassment, they must report it to the Title IX Coordinator. For more information about sexual harassment, including resources available to assist students, please visit smu.edu/sexualmisconduct.

Pregnant and Parenting Students

Under Title IX, students who are pregnant or parenting may request academic adjustments by contacting the Office of Student Advocacy and Support by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.

Academic Policies

Religious Observance

Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester and should discuss with them, in

advance, acceptable ways of making up any work missed because of the absence. Click here for a list of holidays.

Medical-Related Absences

To ensure academic continuity and avoid any course penalties, students should follow procedures described by their instructors in order to be provided with appropriate modifications to assignments, deadlines, and exams.

Excused Absences for University Extracurricular Activities

Students participating in an officially sanctioned, scheduled university extracurricular activity should be given the opportunity to make up class assignments or other graded assignments that were missed as a result of their participation. It is the responsibility of the student to make arrangements for make-up work with the instructor prior to any missed scheduled examinations or other missed assignments. (See current Catalog under heading of "Academic Records/Excused Absences.")

Final Exams

Final course examinations shall be given in all courses where appropriate, and some form of final assessment is essential. Final exams and assessments must be administered as specified in the official examination schedule. Exams cannot be administered or due during the last week of classes or during the Reading Period. Syllabi must state clearly the form of the final exam or assessment, and the due date and time must match the official SMU exam schedule. Final exams are not required to be provided online.

Academic Dishonesty

Students are expected to embrace and uphold the SMU Honor Code. Violations of the Honor Code will be acted upon in accordance with the policies and procedures outlined in the Mustang Student Handbook.

Student Support Services

Student Academic Success Programs

Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students who would like support for subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; smu.edu/sasp.

Caring Community Connections Program

CCC is a resource for anyone in the SMU community to refer students of concern to the Office of the Dean of Students. The online referral form can be found at smu.edu/deanofstudentsccc. After a referral form is submitted, students will be contacted to discuss the concern, strategize options, and be connected to appropriate resources. Anyone who is unclear about what steps to take if they have concerns about students should contact the Office of the Dean of Students at 214-768-4564.

Mental Health Resources: On-Call and Ongoing Counseling Services

Throughout the academic year, students may encounter different stressors or go through life experiences which impact their mental health and academic performance. Students who are in distress or have concerns about their mental health can schedule a same-day or next-day appointment to speak with a counselor by calling Counseling Services. Counselors are available at any time, day or night for students in crisis at this number: 214-768-2277 (then select option 2) They will be connected with a counselor immediately. Students seeking ongoing counseling should call the same number (214-768-2277, then select option 1) during normal business hours to schedule an initial appointment.

Campus Carry Law

In accordance with Texas Senate Bill 11, also known as the ‘campus carry’ law, and following consultation with entire University community, SMU chooses to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see: smu.edu/campuscarrylaw.