

Course Syllabus

Course Information

Course Number/Section Phys 2303.001
Course Title Contemporary Physics

Term Fall 2016
Days & Times Tuesday, Thursday 10:00am – 11:15am
Room FN 2.104

Professor Contact Information

Professor Matthew Titsworth
Email Address matthew.titsworth@utdallas.edu
Office Location Phy 1.602
Office Hours Tuesday, Thursday, 11:30am – 12:30pm

Course Pre-requisites, Co-requisites, and/or Other Restrictions

No prerequisites; Introductory course. Some knowledge of algebra, geometry, and trigonometry is assumed.

Course Description

Introductory course in physics including optics and concepts of nature developed in the 20th century. Topics include the nature of light, fundamentals of geometric optics, interference, diffraction, introduction to special relativity, introduction to quantum mechanics, atomic particles, atomic structure, emission and absorption spectra, the nucleus, nuclear reactions, radioactivity, and elementary particles. Demonstrations will be included as possible.

Student Learning Objectives/Outcomes

Upon completing this class, students will:

- Be able to explain image formation, location, and magnification by spherical mirrors and lenses.
- Be able to explain the theory of diffraction and interference as applied in single, double, and multi-slit interference and diffraction patterns, diffraction gratings, and thin films.
- Be able to discuss the Special Theory of Relativity in terms of time dilation and length contraction, Lorentz transformations, and space-time coordinates.
- Be able to discuss the basics of quantum mechanics, describe the properties of atomic particles, the structure of the atom, emission and absorption spectra, quantum numbers, the exclusion principle and the periodic table.
- Be able to discuss nuclear properties, nuclear reactions, radioactivity and its applications, and the modern view of sub-atomic particles.

Required Textbooks and Materials

Required Texts

Good news: your textbook for this class is available for free online! If you prefer, you can also get a print version at a very low cost.

Your book is available in web view and PDF for free. You can also purchase on iBooks for \$4.99 or get a print version, if you prefer, via the campus bookstore or from seller ÒOpenStaxÓ on Amazon.com.

You can use whichever formats you want. Web view is recommended -- the responsive design works seamlessly on any device.

College Physics from OpenStax, ISBN 1938168003, www.openstax.org/details/college-physics

Required Materials

In addition to the OpenStax text book we will be using two products designed to work with it: Concept Coach and ExpertTA.

Reading assignments will be evaluated with Concept Coach. Concept Coach is a free learning tool embedded in your online book. After reading a section of the book, launch Concept Coach to complete practice questions and give your learning a boost.

To register for Concept Coach:

1. Paste this link in your web browser to visit the class textbook:

<https://cnx.org/contents/JydfSfIS:3>

You can also find your Concept Coach book by visiting cc.openstax.org and clicking “Student Portal.”

2. In the browser, click the orange “Jump to Concept Coach” button to jump to to the Concept Coach widget at the end of the section. Click “Launch Concept Coach” to open your Concept Coach log-in window.

3. If you’re new to Concept Coach, click “Sign up for Concept Coach” and follow the prompts to create your free account. If you’ve used Concept Coach before, click “Sign In” to sign in.

4. After signing in, enter your enrollment code for this course. Your enrollment code is:
101784

5. On the enrollment confirmation screen, input your school-issued ID number so your instructor can identify you.

6. Continue to your Concept Coach questions!

Additionally, an ExpertTA account will be required for homework assignments. Registration is \$27.50 and can be completed at <http://www.theexpertta.com/registration/>. The course code will be provided in class.

Suggested Course Materials

Suggested Readings/Texts

Suggested Materials

Assignments & Academic Calendar

Topics, Reading Assignments, Due Dates, Exam Dates

Topic	Study Assignments (Chapter in Book)
Geometric Optics	25
• The Ray Aspect of Light	• 25.1
• The Law of Reflection	• 25.2
• The Law of Refraction	• 25.3
• Total Internal Reflection	• 25.4
• Dispersion: The Rainbow and Prisms	• 25.5
• Image Formation by Lenses	• 25.6
• Image Formation by Mirrors	• 25.7
Vision and Optical Instruments	26
• Physics of the Eye	• 26.1
• Vision Correction	• 26.2
• Color and Color Vision	• 26.3
• Microscopes	• 26.4
• Telescopes	• 26.5
• Abberations	• 26.6
Wave Optics	27
• The Wave Aspect of Light: Interference	• 27.1
• Huygen's Principle: Diffraction	• 27.2
• Young's double slit experiment	• 27.3
• Multiple Slit Diffraction	• 27.4
• Single Slit Diffraction	• 27.5
• Limits of Resolution: The Rayleigh Criterion	• 27.6
• Thin Film Interference	• 27.7
• Polarization	• 27.8
EXAM 1	About September 22
Special Relativity	28
• Einstein's Postulates	• 28.1
• Simultaneity and Time Dilation	• 28.2
• Length Contraction	• 28.3
• Relativistic Addition of Velocities	• 28.4
• Relativistic Momentum	• 28.5
• Relativistic Energy	• 28.6
Introduction to Quantum Physics	29
• Quantization of Energy	• 29.1
• The Photoelectric Effect	• 29.2
• Photon Energies and The Electromagnetic Spectrum	• 29.3
• Photon Momentum	• 29.4
• The Particle-Wave Duality	• 29.5

• The Wave Nature of Matter	• 29.6
• Probability: The Heisenberg Uncertainty Principle	• 29.7
Exam 2	About October 20
Atomic Physics	30
• Discovery of The Atom	• 30.1
• Discovery of The Parts of The Atom: Electrons and Nuclei	• 30.2
• Bohr's Theory of The Hydrogen Atom	• 30.3
• X-Rays: Atomic Origins and Applications	• 30.4
• Applications of Atomic Excitations and De-excitations	• 30.5
• The Wave Nature of Matter Causes Quantization	• 30.6
• Patterns in Spectra Reveal More Quantization	• 30.7
• Quantum Numbers and Rules	• 30.8
• The Pauli Exclusion Principle	• 30.9
Radioactivity and Nuclear Physics	31
• Nuclear Radioactivity	• 31.1
• Radiation Detection and Detectors	• 31.2
• Substructure of the Nucleus	• 31.3
• Nuclear Decay and Conservation Laws	• 31.4
• Half-Life and Activity	• 31.5
• Binding Energy	• 31.6
• Tunneling	• 31.7
• Fusion	• 32.5 (!)
• Fission	• 32.6 (!)
Other topics as time Permits	
FINAL EXAM	During Exam Week

Grading Policy

Exams – 60%

- There will be three exams spaced at approximately 1/3, 2/3 and at the end of the semester. Dates given above are approximate. The exact date will be announced one week before each exam. Exams will be given a numerical score.

Reading Assignments – 15%

- Students are responsible for answering the ConceptCoach questions at the end of each assigned section. These should generally be done before class so that students have time to process the material.

Homework Assignments – 15%

- Homework will be assigned using the ExpertTA platform and I encourage you to work together as is possible. Each assignment will be given a due date and an end date. Homework is due by the due date in order to receive full credit for the assignment. Homework completed after the due date but before the end date will receive half credit.

Group Project – 10%

- There is far more to the physics of the 20th and 21st centuries than what we will be able to cover in class. As such, students will be required to complete a project on a topic not covered in the class. The exact shape and form of this project will be determined as it comes up.

Course Policies

Make-up exams

Make-up exams will be given entirely at my discretion and may only be given for medical emergencies and suitably serious conflicts. Documentation is required in all cases, prior to the exam in the case of conflicts.

Extra Credit

No extra credit will be given.

Late Work

Late work will only be accepted for homework as detailed above.

Special Assignments

TBD

Class Attendance

Students are encouraged to attend all classes. Exams and Homework assignments will be based upon the material covered in class.

Classroom Citizenship

For the benefit of fellow students and your instructor, each student is expected to practice common courtesy with regards to class interactions. Repeated disruption of class will be grounds for a reduction in your final grade.

The following is a not comprehensive list of things which will be considered a disruption to the class:

- Tardiness
- Leaving early
- Rustling papers in preparation to leave before class is over.
- Phone calls
- Text/IM/Snapchat/email/etc
- video/music/etc
- accessing the internet not related to class

I reserve the right to expand or except any part of this list at any time contingent upon the circumstances.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

“As a Comet, I pledge honesty, integrity, and service in all that I do.”

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University’s policies and procedures segment of the course syllabus.

Please go to <http://go.utdallas.edu/syllabus-policies> for these policies.

Sharing Confidential Information

Students considering sharing personal information in email, in person, or within assignments or exams should be aware that faculty members and teaching/research assistants are required by UT Dallas policy to report information about sexual misconduct to the UT Dallas Title IX Coordinator. Per university policy, faculty have been informed that they must identify the student to the UT Dallas Title IX Coordinator. Students who wish to have confidential discussions of incidents related to sexual harassment or sexual misconduct should contact the Student Counseling Center (972-883-2527 or after hours 972-UTD-TALK or 972-883-8255), the Women's Center (972-883-8255), a health care provider in the Student Health Center (972-883-2747), the clergyperson (or other legally recognized religious advisor) of their choice, or an off-campus resource (i.e., rape crisis center, doctor, psychologist). Students who are sexually assaulted, harassed, or victims of sexual misconduct, domestic violence, or stalking, are encouraged to directly report these incidents to the UT Dallas Police Department at 972-883-2222 or to the Title IX Coordinator at 972-883-2218. Additional information and resources may be found at <http://www.utdallas.edu/oiec/title-ix/resources>.

Technical Support

If you experience any issues with your UT Dallas account, contact the UT Dallas Office of Information Technology Help Desk: assist@utdallas.edu or call 972-883-2911.

UT Dallas provides eLearning technical support 24 hours a day/7 days a week. The services include a toll free telephone number for immediate assistance (1-866-588-3192), email request service, and an online chat service. Please use this link to access the UTD eLearning Helpdesk: <http://www.utdallas.edu/elearning/eLearningHelpdesk.html>.

Field Trip Policies, Off-Campus Instruction and Course Activities

Off-campus, out-of-state, foreign instruction/travel, and course-related field trip activities are subject to state law and University policies and procedures regarding travel and risk-related activities.

Detailed information regarding this policy, in accordance to *Texas Education Code*, Section 51.950, can be accessed at the UT Dallas Policy Navigator, <http://policy.utdallas.edu/utdbp3023>, and at <http://www.utdallas.edu/administration/insurance/travel>. Additional information is available from the office of the school dean.

Student Conduct and Discipline

The University of Texas System (Regents' Rule 50101) and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. General information on student conduct and discipline is contained in the UT Dallas online catalogs (<http://catalog.utdallas.edu>).

The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Student Code of Conduct, UTDSP5003 (<http://policy.utdallas.edu/utdsp5003>). Copies of these rules and regulations are available to students in the Office of Community Standards and Conduct, where staff members are available to assist students in interpreting the rules and regulations (SSB 4.400, 972-883-6391) and online at <https://www.utdallas.edu/conduct/>.

A student at the University neither loses their rights nor escapes the responsibilities of citizenship. He or she is expected to obey federal, state, and local laws as well as the Regents' Rules, university regulations, and administrative rules. Students are subject to discipline for violating its standards of conduct whether such conduct takes place on or off campus, or whether civil or criminal penalties are also imposed for such conduct.

Academic Integrity

The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrates a high standard of individual honor in his or her scholastic work.

Academic Dishonesty: Academic dishonesty can occur in relation to any type of work submitted for academic credit or as a requirement for a class. It can include individual work or a group project. Academic dishonesty includes plagiarism, cheating, fabrication, and collaboration/collusion. In order to avoid academic dishonesty, it is important for students to fully understand the expectations of their professors. This is best accomplished through asking clarifying questions if an individual does not completely understand the requirements of an assignment.

Additional information related to academic dishonesty and tips on how to avoid dishonesty may be found here: <https://www.utdallas.edu/conduct/dishonesty/>.

Copyright Notice

It is the policy of the University of Texas at Dallas to adhere to the requirements of the United States Copyright Law of 1976, as amended, (*Title 17, United States Code*), including ensuring that the restrictions that apply to the reproduction of software are adhered to and that the bounds of copying permissible under the fair use doctrine are not exceeded. Copying, displaying, reproducing, or distributing copyrighted material may infringe upon the copyright owner's rights. Unauthorized distribution of copyrighted material, including unauthorized peer-to-peer file sharing, may subject students to appropriate disciplinary action as well as civil and criminal penalties. Usage of such material is only appropriate when that usage constitutes "fair use" under the Copyright Act. For more information about the fair use exemption, see <http://copyright.lib.utexas.edu/copypol2.html>. As a UT Dallas student, you are required to follow UT Dallas' copyright policy (UTDPP1043 at <http://policy.utdallas.edu/utdpp1043>) and the UT System's policy, UTS107 at <http://www.utsystem.edu/board-of-regents/policy-library/policies/uts107-use-copyrighted-materials>.

Email Use

The University of Texas at Dallas recognizes the value and efficiency of communication between faculty/staff and students through electronic mail. At the same time, email raises some issues concerning security and the identity of each individual in an email exchange. All official student email correspondence will be sent only to a student's UT Dallas email address and UT Dallas will only consider email requests originating from an official UT Dallas student email account. This allows the University to maintain a high degree of confidence in the identity of each individual's corresponding via email and the security of the transmitted information. The University of Texas at Dallas furnishes each student with a free email account that is to be used in all communication with university personnel. The Office of Information Technology provides a method for students to have their UT Dallas mail forwarded to other email accounts. To activate a student UT Dallas computer account and forward email to another account, go to <http://netid.utdallas.edu>.

Class Attendance

Regular and punctual class attendance is expected. Students who fail to attend class regularly are inviting scholastic difficulty. Absences may lower a student's grade where class attendance and class participation are deemed essential by the instructor. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes.

Withdrawal from Class

The administration at UT Dallas has established deadlines for withdrawal from any course. These dates and times are published in the Comet Calendar (<http://www.utdallas.edu/calendar>) and in the Academic Calendar <http://www.utdallas.edu/academiccalendar>). It is the student's responsibility to handle withdrawal requirements from any class. In other words, a professor or other instructor cannot drop or withdraw any student unless there is an administrative drop such as the following:

- Have not met the prerequisites for a specific course
- Have not satisfied the academic probationary requirements resulting in suspension
- Office of Community Standards and Conduct request
- Have not made appropriate tuition and fee payments
- Enrollment is in violation of academic policy
- Was not admitted for the term in which they registered

It is the student's responsibility to complete and submit the appropriate forms to the Registrar's Office and ensure that he or she will not receive a final grade of "F" in a course if he or she chooses not to attend the class after being enrolled.

Student Grievance Procedures

Procedures for student grievances are found in university policy UTDSP5005 (<http://policy.utdallas.edu/utdsp5005>). In attempting to resolve any student grievance regarding disputes over grades, application of degree plan, graduation/degree program requirements, and

thesis/and dissertation committee, adviser actions and/or decisions, evaluations, and/or other fulfillments of academic responsibility, it is the obligation of the student first to make a serious effort to resolve the matter with the instructor, supervisor, administrator, or committee with whom the grievance originated.

Incomplete Grade Policy

As per university policy, incomplete grades may be given, at the discretion of the instructor of record for a course, when a student has completed at least 70% of the required course material but cannot complete all requirements by the end of the semester. An incomplete course grade (grade of 'I') must be completed within the time period specified by the instructor, not to exceed eight (8) weeks from the first day of the subsequent long semester. Upon completion of the required work, the symbol 'I' may be converted into a letter grade (A through F). If the grade of Incomplete is not removed by the end of the specified period, it will automatically be changed to F.

AccessAbility Services

It is the policy and practice of The University of Texas at Dallas to make reasonable accommodations for students with properly documented disabilities. However, written notification from the Office of Student AccessAbility (OSA) is required. If you are eligible to receive an accommodation and would like to request it for this course, please discuss it with your professor and allow one week advance notice. Students who have questions about receiving accommodations, or those who have, or think they may have, a disability (mobility, sensory, health, psychological, learning, etc.) are invited to contact OSA for a confidential discussion. OSA is located in the Student Services Building, SSB 3.200. They can be reached by phone at 972-883-2098, or by email at studentaccess@utdallas.edu.

Religious Holy Days

The University of Texas at Dallas will excuse a student from class or other required activities, including examinations and travel time for the observance of a religious holy day for a religion whose places of worship are exempt from property tax under Section 11.20, of the *Texas Tax Code*.

Students are encouraged to notify the instructor or activity sponsor as soon as possible regarding the absence, preferably in advance of the assignment.

Excused students will be allowed to take missed exams or complete assignments within a reasonable time after the absence: a period equal to the length of the absence, up to a maximum of one week. A student who notifies the instructor and completes any missed exam or assignment may not be penalized for the absence. A student who fails to complete the exam or assignment within the prescribed period may receive a failing grade for that exam or assignment.

If a student or an instructor disagrees about the nature of the absence [i.e., for the purpose of observing a religious holy day] or if there is similar disagreement about whether the student has been given a reasonable time to complete any missed assignments or examinations, either the student or the instructor may request a ruling from the President of UT Dallas or from the

President's designee. The chief executive officer or designee must take into account the legislative intent of *Texas Education Code* 51.911(b), and the student and instructor will abide by the decision of the chief executive officer or designee.

Resources to Help You Succeed

The Office of Student Success operates the Student Success Center (SSC, <http://www.utdallas.edu/studentsuccess>), which offers assistance to students in the areas of writing, mathematics, communication, multiple science fields, reading, study skills, and other academic disciplines. These services are available through individual and small group appointments, workshops, short courses, and a variety of online and instructional technologies. All students enrolled at UT Dallas are eligible for these services.

The **Math Lab** gives short-term and semester long support for a variety of introductory and advanced mathematics courses. Students may drop in to visit with a math tutor on a regular basis. Comet card is required.

The **Writing Center** offers a collaborative learning environment for one-to-one and small group assistance with general and advanced writing assignments and overall writing skills. Scheduling an appointment is strongly recommended, but walk in appointments are possible if a tutor is available.

The **Peer Tutoring** program offers free tutoring assistance in multiple locations for many of the historically challenging undergraduate subjects at UT Dallas. Tutoring sessions, offered every weekday on a drop-in basis, are one-on-one or in a small group format. The sessions are designed to meet students' individual questions and needs related to course/subject concepts. All peer tutors are current UT Dallas students who made an A- or better in the course and have a strong faculty/staff recommendation. Students should check the Student Success Center website each semester for subject offerings and session times.

The **Peer-Led Team Learning (PLTL)** program provides an active, engaged learning experience for students who meet in small groups once a week with a Peer Leader who helps guide them through a potentially difficult gateway course. Students that attend sessions regularly typically earn a half to a whole letter grade higher than students that do not participate in the PLTL program.

Supplemental Instruction (SI) provides free, peer-facilitated weekly study sessions for students taking historically difficult courses. SI sessions encourage active, collaborative learning based on critical thinking and transferable study skills. SI leaders attend lectures, take notes, and read assigned material just like the enrolled students. Students should check the SSC website for subject and session times.

The **Communication Lab (CommLab)** offers one-on-one and group consultations where you will gain practical feedback for improving oral and group presentations.

Success Coaches are available for individual student appointments to discuss study skills, time management, note taking, test taking and preparation, and other success strategies.

The Student Success Center's main office is located in the McDermott Library Building and can be contacted by calling 972-883-6707 or by sending an email to ssc@utdallas.edu.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.