

PHYS 4392 Course Syllabus

Course Overview

Fundamental principles of electrodynamics, including electrostatics, magnetostatics, electric potential, electric and magnetic fields in matter, simple behavior of time-dependent electric and magnetic fields, and Maxwell's equations.

Prerequisites: PHYS 1304, MATH 3302, MATH 3313. PHYS 4321 recommended.

This is a flipped active-learning class in which students can expect to do preparatory work before class and then work together during class.

Instructor Biography

Prof. Dalley is a theoretical physicist who has worked in Oxford, Cambridge, Princeton and CERN. He has been teaching physics courses at SMU, from non-science majors to graduate students, since 2006. In 2013, Prof. Dalley received both an Outstanding Professor Rotunda Award and the Provost's Teaching Recognition Award. At SMU he also directs science outreach programs and professional development courses for high-school physics teachers.

Student Learning Outcomes

The student should be able to:

- Calculate the electrostatic potential from a knowledge of the electrostatic electric field, by using the multipole expansion in tandem with a knowledge of the charge distribution, using the method of images, or the separation of variables technique to solve Laplace's equations.
- Describe the electrostatic properties of conductors and dielectrics, calculate static electric fields with the differential and integral forms of Gauss' law and bound charge distributions in dielectrics.
- Calculate the static magnetic field in vacuum and in magnetic materials for a given time-independent current density
- Calculate time-dependent behavior of electric and magnetic fields in vacuum using Maxwell's equations

Class Meeting: Tu/Th 2:00 p.m. – 3:20 p.m. Zoom ID 477 628 4599 Passcode *dalleyphys*
You will only be able to join Zoom meetings while signed in to your SMU account via SSO.

Instructor: S. Dalley, sdalley@smu.edu

Office Hours: Tu/Th 1:00 – 2:00 p.m. or by appointment

Required Text: "Introduction to Electrodynamics" 4th edition by David. J. Griffiths, (Pearson) ISBN 978-0-321-85656-2. Other editions OK if you make the translation.

Statement on Communication

For personal messages, please contact me via your smu email and not Canvas as messaging/comments in Canvas are not forwarded to my email. I will respond to your email within a few hours typically. Responses might be slightly delayed on holidays and weekends. I will communicate with the class via Canvas Announcements. It is your responsibility to check Canvas Announcements and your SMU email.

Statement on Attendance

If you are absent from class without valid reason for two consecutive weeks or for more than 6 classes total and are scoring a failing grade you will be administratively dropped from the course.

Grading

Your course grade will be calculated according to the following assessments

WARMUPS (15%)

Before each class you are expected to read relevant sections of the textbook, attempt the problem from Griffiths or the Warmup worksheet, and upload to Canvas by the deadline before class. It is graded $\frac{1}{2}$ for effort, $\frac{1}{2}$ for correctness. Late Warmups are not accepted but the lowest two Warmup scores will be dropped.

HOMEWORKS (30%)

Post-class homework assignments are due in Canvas most weeks. Late homeworks are not counted for credit but the lowest homework score will be dropped.

IN-CLASS TESTS (7% each)

There will be three 75-min in-class open-reference tests on the most recent topics, given as timed Canvas Assignments. You must be present in Zoom during the test and will be in your own breakout room. Without documentary evidence (image) of a technical problem, the test score will be reduced by 5% for each minute late that the submission deadline in Canvas is missed.

TEST REDOs (3% each)

You have the opportunity to correct your graded Tests in your own time. Redos must be submitted in Canvas within one week of receiving your graded Test back. If no Redo is submitted, the original Test score will count for the Redo credit.

FINAL EXAM (25%)

There will be a 3 hr comprehensive open-source final exam given as a timed Canvas assignment. You You must be present in Zoom during the test and will be in your own breakout room. Without documentary evidence (image) of a technical problem, the test score will be reduced by 5% for each minute late that the submission deadline in Canvas is missed.

In determining the overall course grade, if the score on each initial test and on the final exam is always below 50%, the course grade will be F regardless of performance in other assessments.

Grading Scale

A	A -	B +	B	B -	C +	C	C -	D +	D	D -	F
100-90%	90-85%	85-80%	80-75%	75-70%	70-65%	65-60%	N/A	N/A	60-50%	N/A	below 50%

Course Outline/Calendar

Date	TOPIC	Pre-Class Prep	HW due
1/26	Introduction & Vector Algebra	Read 1.1	
1/28	Vector Calculus	Read 1.2-3 Do 1.20	
2/2	Curvilinear Coords, Dirac Delta, Field Theorems	Read 1.4-6 Do Warmup 1	1.7, 1.25, 1.33
2/4	Electrostatic Field & Gauss' Law	Read 2.1-2 Do Warmup 2	
2/9	Electrostatic Potential & Energy	Read 2.3-4 Do Warmup 3	1.43, 2.6, 2.16
2/11	Conductors	Read 2.5 Do Warmup 4	
2/16	<i>Review of 1.1 – 2.5</i>		2.27, 2.38, 2.43
2/18	<i>Test 1</i>	1.1 – 2.5	
2/23	Laplace's Equation & Method of Images	Read 3.1-3.2 Do 3.7	
2/25	Separation of Variables	Read 3.3 Do Warmup 5	
3/2	Electrostatic Multipole Expansion	Read 3.4 Do Warmup 6	3.9, 3.13, 3.19
3/4	Electric Polarization	Read 4.1-2 Do Warmup 7	
3/9	Electric Displacement and Linear Dielectrics	Read 4.3 – 4.4.1 Do Warmup 8	3.28, 3.31, 4.11
3/11	Boundaries and Energy in Dielectrics	Read 4.4.2 – 4.4.4. Do Warmup 9	
3/16	<i>Review of 3.1 - 4.4</i>		4.18, 4.21, 4.26
3/18	<i>Test 2</i>	3.1 - 4.4	
3/23	Lorentz Force & Current Density	Read 5.1 Do 5.3	
3/25	Biot-Savart Law & Div/Curl of B	Read 5.2 - 5.3.2 Warmup 10	
3/30	Ampere's Law & Maxwell's Static Equations	Read 5.3.3 – 5.3.4 Do Warmup 11	5.5, 5.10, 5.11
4/1	Magnetic Vector Potential	Read 5.4 Do Warmup 12	
4/6	Magnetization	Read 6.1 – 6.2 Do Warmup 13	5.15, 5.21, 5.35
4/8	H Field	Read 6.3-6.4 Do 6.14	
4/13	<i>Review of 5.1 – 6.4</i>	Practice Test 3	6.3, 6.8, 6.16
4/15	<i>Test 3</i>	5.1 – 6.4	
4/20	Electromotive Force	Read 7.1 Do Warmup 14	
4/22	Magnetic Induction	Read 7.2 Do Warmup 15	
4/27	Maxwell's Equations	Read 7.3 Do 7.36	7.8, 7.16, 7.22
4/29	<i>Review of 7.1 – 7.3</i>		
	<i>Final Exam</i>	Chaps 1 – 7	

Disclaimer: The instructor reserves the right to make changes to the schedule of the class. Any alterations will be announced in class, in Canvas or via email by the instructor. Students who do not check Canvas or their email assume full responsibility for missing alterations to the course.

Institutional Policies & Procedures

Disability Accommodations

Students needing academic accommodations for a disability must first register with Disability Accommodations & Success Strategies (DASS). Students can call 214-768-1470 or visit <http://www.smu.edu/Provost/SASP/DASS> (Links to an external site.) to begin the process. Once approved and registered, students will submit a DASS Accommodation Letter to faculty through the electronic portal *DASS Link* and then communicate directly with each instructor to make appropriate arrangements. Please note that accommodations are not retroactive and require advance notice to implement.

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. (<https://www.smu.edu/StudentAffairs/Chaplain/ReligiousHolidays> (Links to an external site.)).

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 missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (See [2020-2021 SMU Undergraduate Catalog](#) (Links to an external site.) under “Enrollment and Academic Records/Excused Absences.”)

Student Academic Success Programs

Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students wishing support with subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; <https://www.smu.edu/sasp> (Links to an external site.).

Pregnant and Parenting Students

Accommodations for pregnant and parenting students: Under Title IX students who are pregnant or parenting may request academic adjustments by contacting Elsie Johnson (elsiej@smu.edu) in the Office of the Dean of Students, or 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.

Covid-19 Attendance

Students who are experiencing COVID-19 symptoms or who have been notified through contact tracing of potential exposure and need to self-quarantine or isolate must follow the protocols laid out in [SMU's Contact Tracing Protocol \(Links to an external site.\)](#). To ensure academic continuity, students in these situations will not be penalized and will be provided appropriate modifications to assignments, deadlines, and testing. Please also note that SMUFlex classes might, in rare circumstances, go remote for two-week periods to accommodate COVID-related issues. To ensure these necessary accommodations, affected students must:

- Provide as much advance notification as possible to the instructor about a change in circumstances. Students must notify their instructor about a potential absence as well as plans for a return to class. For cases in which students test positive for COVID-19, they should fill out a [CCC form at this link \(Links to an external site.\)](#).
- Continue participation in class via Zoom, as health circumstances permit. Attend class regularly, when not in a situation outlined above, in accordance with safety measures laid out by SMU CAN in the [Pledge to Protect \(Links to an external site.\)](#) (including wearing masks, maintaining social distancing, and cleaning personal space after class). In-person participation in SMUFlex classes is required on students' assigned red/blue rotation days except in cases when students are experiencing illness, are in self-quarantine or in isolation.
- Students facing multiple or extended COVID-19-related absences or illness can work with the Office of the Dean of Students to consider options such as fully remote learning or medical withdrawal.

Academic Dishonesty

Students are expected to embrace and uphold the [SMU Honor Code \(Links to an external site.\)](#). Violations of the Honor Code will be acted upon in accordance with the policies and procedures outlined in the [Mustang Student Handbook \(Links to an external site.\)](#). Examples of academic dishonesty are:

- Communication via any method with anyone else, whether real or virtual, during any exam.
- Sharing or copying an assignment intended to be done individually.
- This course operates a policy of zero tolerance toward Academic Dishonesty in any form in any graded assessment. It will usually result in an F grade for the course and a filing with the Dean of Student Life (Honor Code Violation).

Tech Requirements & Help

Please be sure that your device or devices meet the **technical requirements** for Canvas. [Technical requirements](#) and [browser requirements](#) for Canvas are located in the [Canvas Student Guide](#). If you need Technical Support with Canvas, click the Help link on the left side [Global Navigation](#). From there you can Search Canvas Guides, Chat with Support, or Submit a Request for assistance. You can also contact the SMU [IT Help Desk](#) for assistance with Canvas.

To be successful in this course, students should have basic keyboarding and computer skills, and be comfortable navigating the Internet. This fully remote course occurs primarily via canvas.smu.edu. [Zoom](#) Web Conferencing is used in this course as well for virtual (i.e., real-time, synchronous) meetings, and [Panopto \(Links to an external site.\)](#) is used for recording audio/video assignments.

TECHNICAL SUPPORT

If you run into any technical problems, there are a number of resources available to you. First, you can always check with me; in many cases, I can walk you through technical issues. Also, you can contact the [SMU IT Help Desk](#) for assistance with Canvas and Zoom. Otherwise, here are additional useful resources:

- [Canvas \(Links to an external site.\)](#)
 - Click [HelpLinks to an external site.](#) on the [Global Navigation \(Links to an external site.\)](#) to search the Guides, [Chat \(Links to an external site.\)](#) or contact Instructure Support via email or phone
- Panopto
 - Search the [Panopto Support site \(Links to an external site.\)](#) (Links to an external site.) for forums and documentation, or contact the [SMU IT Help Desk. \(Links to an external site.\)](#)
- Zoom
 - Search their [Knowledge Base \(Links to an external site.\)](#) or [Submit a Request \(Links to an external site.\)](#)

PANOPTO VIDEO APP for CANVAS

If requested, you will use the [Panopto \(Links to an external site.\)](#) to submit video assignments. Be sure your device or devices meet the Panopto's [technical requirements \(Links to an external site.\)](#), and if you need Panopto support contact the SMU [IT Help Desk \(Links to an external site.\)](#).

ZOOM

[Zoom \(Links to an external site.\)](#) is used for online synchronous (i.e., real-time) meetings in this course. Please be sure your devices meet the [technical requirements \(Links to an external site.\)](#) for Zoom. Meeting ID 477 628 4599 Passcode *dalleyphys*. **You will only be able to join Zoom meetings while signed in to your SMU account via SSO.** [https://www.smu.edu/OIT/Services/Shibboleth \(Links to an external site.\)](https://www.smu.edu/OIT/Services/Shibboleth)

PRIVACY POLICIES

- [Canvas by Instructure](#)
- [Panopto Privacy \(Links to an external site.\) \(Links to an external site.\)](#)
- [SMU OIT Policies and Legislation](#)
- [Zoom \(Links to an external site.\)](#)

ACCESSIBILITY

- Canvas
 - [Accessibility within Canvas](#)
 - [Voluntary Product Accessibility Template](#)
- [Panopto \(Links to an external site.\) \(Links to an external site.\)](#)
- [Zoom](#)
-

Student Services

The following services and resources are available to SMU students:

- [Altshuler Learning Enhancement Center](#)
 - ALEC offers study-skill workshops and can help you with learning strategies and test preparation. Their phone number is (214) 768-3648.
- [Altshuler Writing Center](#)
 - The Altshuler Writing Center is open to all undergraduate students who need technical advice on their assigned papers. The writing center is open most afternoons and a few evenings. To work with someone at the writing center you must make an appointment in advance. To contact please call (214) 768-3648.
- [DASS](#)
 - Students needing academic accommodations for a disability must first contact [Disability Accommodations & Success Strategies \(DASS\)](#) at (214) 768-1470 to verify the disability and to establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See an attachment describes the DASS [procedures \(Links to an external site.\)](#) and relocated office.) If you have a disability accommodation you must contact DASS and have a letter of

accommodation delivered to the instructor no later than the third day of class. You can email a scanned copy of your letter.

- [my.SMU](#)
 - Online portal for SMU students that allows you to view personal information, emergency contact information, register for AARO (if applicable), view class schedule, enroll in classes, add/drop/swap classes, view grades and view financial aid packages.
- [SMU Bookstore](#)
 - Information on textbooks, events, buyback, promotions and more.
- [SMU Bursar](#)
 - Information on student finances, bill pay and more.
- [SMU Counseling Services](#)
 - College can be a stressful time. There are many transitions and major life events occurring while you are a college student. If you or a friend is going through a difficult time and needs someone to talk to please seek out the resources provided by the counseling center, located in the Health Center and their phone number is (214) 768-2211. For 24 hour help contact (214) 768-2860.
- [SMU Dedman Recreation Center](#)
 - Regular exercise is one of the best things you can do for your mental and physical well-being.
- [SMU Libraries](#)
 - SMU Libraries has reference librarians happy to help with your research needs. Contact a librarian at <http://askalibrarian.smu.edu/> or call (214) 768-2326.
- [SMU OIT](#)
 - OIT provides computing, information processing, and communications resources to satisfy the needs of faculty, students, and staff, and offers comprehensive support services to help them use technology effectively and creatively.
- [SMU Student Affairs](#)
 - SMU Student Affairs is a network of [departments, programs and services](#) focused on supporting students' out-of-classroom experiences and co-curricular learning.