

# PHY350 Electromagnetic Theory

Gustavus Adolphus College Spring 2022

**Instructor:** Dr. Tom Huber

**Office:** Olin Hall 209

**Schedule:** [rebrand.ly/huber\\_schedule](https://rebrand.ly/huber_schedule)

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**Course Assignments and Resource Page:** 2022 s-phy-350-001 Page at [moodle.gac.edu](https://moodle.gac.edu)

**Textbooks:** *Electromagnetic Fields* (2nd Edition), by Roald K. Wangsness  
*Mathematical Handbook of Formulas and Tables*, by Murray R. Spiegel

## **Course Policy and Evaluation:**

- 1. Class Meetings and Reading Assignments:** The class will meet five days a week from 12:30-1:20 PM. The student is expected to read the assigned chapters in the text **before** coming to class. See the schedule for reading assignments. Usually, four periods per week will be used for lecture and group activities. Class periods on the fifth day will be used for student presentations of problem solutions or for exams. Attached is a daily calendar of activities for the course. When reading assignments are made for a class session, *the reading is expected to be completed before coming to the class*. All classrooms and labs will follow the most up-to-date [COVID policy of the college](#) with regard to masking, social distance, food and beverage in the classroom, and sanitizing of technology and spaces. Individual faculty members may ask for additional COVID precautions at their discretion. The college strongly recommends surgical or N95 or KN95 masks.
- 2. Ask for Help:** If you have trouble with any aspect of the course, make sure you let me know as early as possible. By being proactive in reaching out for assistance, I can better help you identify strategies for success. If you have any questions about assignment values, attendance, or other course components that are part of course grades, please contact me before the close of the semester grading period. I will have office hours and welcome the opportunity to talk with you. See [rebrand.ly/huber\\_schedule](https://rebrand.ly/huber_schedule)

The background of the students in the class is varied, some have had PHY-370 Advanced Math Methods while others have not. This will present a challenge to all of us. I will try not to assume things which are an integral part of the text or a standard optics course. This means that some material may be a review for some of you, please be patient!

- 3. Classroom and Lab Environment/Ethos:** As is expected in any course in the physics department, each student is asked to work, along with the instructor and their student peers, to develop a culture of cooperation and inclusion within our department. Physics can, at times, be challenging for every one of us, and we all need the respect and support of others. Please do your part in helping to create a positive supportive environment where all members of this classroom community can do their best work.

4. **Attendance:** Students are expected to attend all class sessions as listed on the course calendar, including online synchronous sessions. Students who are required to self-quarantine due to COVID-19 or as the result of a COVID contact trace are not required to inform the instructor of their reason for missing in-person classes, but should contact the instructor via email giving the duration of their absence. These students will be provided with options that will allow them to be counted as participating remotely. Quarantined students who remain active and on track in an existing online class component (for example, Moodle activities) will be considered as “in attendance”
5. **Course Communication:** Students are expected to check their Gustavus email at least once every day to ensure that they receive email messages from their instructor. Assignments and additional resources will be posted on the course Moodle site.
6. **Homework:** Homework problems will be assigned once per week and are due at the beginning of class on the scheduled date. Late homework may be accepted at the discretion of the instructor with a reduction in credit.
7. **Group Activities:** On many days, students will work in groups of two or three to complete an activity or problem in a cooperative-learning setting, submitting a solution before the end of the class period. Each member of the group will receive the same grade for their solution.
8. **Problem Discussions:** Roughly once per week, students will each be assigned to present a discussion of a particular problem illustrative of the concepts studied in class that week. Each student should be prepared to present the solution in about 10-12 minutes, and to respond to questions or lead further discussion of the problem for an additional 2-3 minutes. Each student will have multiple opportunities during the semester to lead a problem discussion. The problems to be discussed will be assigned approximately five days in advance. Grades will be given both for presenters and for participation by others in the subsequent discussions.
9. **Creative E&M Project:** There are a huge number of real-world applications of electricity and magnetism in science, technology, arts, and other areas. Each student will do an independent, creative project investigating an application of E&M. This may involve measurement, modeling, artistic expression, etc. Each student will work with the instructor to identify a project that they will pursue independently, or in small groups. The product of this project will be a short paper describing the project, as well as a presentation/display that can be shared with the class and the wider community.
10. **Technology policy:** All course documents will be posted on the course Moodle site. You may use a laptop/tablet/phone in class, but only to take notes or access class material. Do not use your laptop/tablet/phone to explore the internet, do email, Tweet, visit Facebook, etc. Exceptions may be made to accommodate student disabilities. I may ask that all devices be put away during some class sessions, so please come to class prepared with a pen and paper.
11. **Exams:** There will be four one-hour exams and a two-hour final exam. The date for each of the exams is given in the calendar below. The score of the lowest one-hour exam will be given half weight in the final grade for the course. Students must arrange in advance to take an exam at other than the scheduled time, and may do so only for a valid health or school-related reason.

12. <b>Evaluation:</b>	Homework	20%
	Group Problems	10%
	Problem Discussions	10%
	Independent Project	10%
	Hour Exams	30% (lowest exam will be scaled as ½)
	Final Exam	20%

Assignment of final letter grades will be based upon the following guidelines:

	B+ = 86-90%	C+ = 74-78%	D+ = 62-66%
A = 94-100%	B = 82-86%	C = 70-74%	D = 58-62%
A- = 90-94%	B- = 78-82%	C- = 66-70%	

Assignment of final letter grades will also take into account the instructor's subjective evaluation of the student's attendance, initiative, preparation (particularly quantity and quality of homework), and evidence of improvement.

13. **Incompletes:** A grade of incomplete may be awarded at the discretion of the instructor, if requested by the student, under the following conditions: 1) the last day to withdraw has passed, 2) and unforeseen circumstances beyond the student's control (usually restricted to illness or family emergency) preclude completion of the remaining work for the course by the semester deadline. Note that poor planning or having a lot of work to complete at the end of the term are not, in fairness to other students, considered circumstances beyond a student's control. This additional time to complete coursework may not extend beyond the final day of the following semester, and earlier limits may be set at the discretion of the instructor.
14. **Academic Honesty:** Having signed and agreed to abide by the College's Honor Code, students thereby pledge that, in all academic exercises, examinations, papers, and reports, they shall submit their own work. Footnotes, or some other acceptable form of citation must accompany any use of another's words or ideas. In the context of this course, students are expected to collaborate and to discuss their out-of-class assignments. However, submitting under one's own name work that is merely copied from another is a violation of the Honor Code. (Full descriptions of the Academic Honesty Policy and the Honor Code can be found in the Academic Catalog, online at [https://gustavus.edu/general\\_catalog/current/acainfo](https://gustavus.edu/general_catalog/current/acainfo). For more information about the Honor Code, contact Dean Valerie Banschbach ([vbanschbach@gustavus.edu](mailto:vbanschbach@gustavus.edu) or x7541).
15. **Requesting Accommodations:** Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a disability and anticipate or experience barriers to equal access, please speak with the accessibility resources staff about your needs. A disability may include mental health, attentional, learning, chronic health, sensory, physical, and/or short-term conditions. When appropriate, staff will guide students and professors in making accommodations to ensure equal access. Accommodations cannot be made retroactively; therefore, to maximize your academic success at Gustavus, please contact them as early as possible. Accessibility resources staff are located in the Academic Support Center (<https://gustavus.edu/asc/accessibility/>) (x7227). Accessibility Resources Coordinator, Corrie Odland ([codland@gustavus.edu](mailto:codland@gustavus.edu)), can provide further information.

16. **COVID Resources:** Gustavus Adolphus College is committed to ensuring equitable and inclusive learning environments for all students. If you have a non-disability-related academic concern related to COVID for which you are not already receiving assistance from the Academic Support Center, please contact the Provost's Office ([provostoffice@gustavus.edu](mailto:provostoffice@gustavus.edu)). When appropriate, the Provost's Office will help guide students and faculty in making any necessary academic adjustments.
17. **Multilingual Student Support:** Some Gusties may have grown up speaking a language (or languages) other than English at home. If so, we refer to you as “multilingual.” Your multilingual background is an incredible resource for you, and for our campus, but it can come with some challenges. You can find support through the Center for International and Cultural Education's (<https://gustavus.edu/cice/>) Multilingual and Intercultural Program Coordinator (MIPC), Pamela Pearson ([ppearson@gustavus.edu](mailto:ppearson@gustavus.edu)). Pamela can meet individually for tutoring in writing, consulting about specific assignments, and helping students connect with the College's support systems. If you want help with a specific task (for example, reading word problems on an exam quickly enough or revising grammar in essays), let your professor and Pamela know as soon as possible. In addition, the Writing Center (<https://gustavus.edu/writingcenter/>) offers tutoring from peers (some of whom are themselves multilingual) who can help you do your best writing.
18. **Mental Wellbeing:** The Gustavus community is committed to and cares about all students. Strained relationships, increased anxiety, alcohol or drug problems, feeling down, difficulty concentrating, and/or lack of motivation may affect a student's academic performance or reduce a student's ability to participate in daily activities. If you or someone you know expresses such mental health concerns or experiences a stressful event that can create barriers to learning, Gustavus services are available to assist you, and include online options. You can learn more about the broad range of confidential health services available on campus at <https://gustavus.edu/counseling/> and <https://gustavus.edu/deanofstudents/services/>.
19. **Title IX: Sexual Misconduct Prevention and Resources:** Gustavus Adolphus College recognizes the dignity of all individuals and promotes respect for all people. As such, we are committed to providing an environment free of all forms of discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, domestic violence, dating violence, and stalking. If you (or someone you know) has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available; you can learn more online at <https://gustavus.edu/titleix/>.

Please know that if you choose to confide in me, I am required by the College to report to the Title IX Coordinator, because Gustavus and I want to be sure you are connected with all the support the College can offer. Although it is encouraged, you are not required to respond to outreach from the College if you do not want to. You may speak to someone confidentially by contacting the Sexual Assault Response Team (SART/CADA), Chaplains, Counseling Center, or Health Service staff; conversations with these individuals can be kept strictly confidential. SART/CADA can be reached 24 hours a day at 507-933-6868. You can also make a report yourself, including an anonymous report, through the form at <https://gustavus.edu/titleix/>.

Section coverage – §, Discussion problems, HW Due dates, and Exams

All dates, coverage, problem numbers etc **subject to change**.

Wk/Mo	Monday	Tuesday	Wednesday	Thursday	Friday
1 / Jan 31			§1.1—1.11	§1.12—1.15 Group 1, 1	§1.16—1.18 Group 1, 2
2 / Feb 7	§1.19—1.20 Group 1, 3	§2.1—2.4 Prob: 1.8, 1.21	§2.5 HW Ch. 1 Group 2, 1	§3.1—3.3 Group 3, 1	§3.4—4.1 Group 3, 2
3 / Feb 14	§4.2 Prob: 2.8, 3.7	§4.3 HW Ch. 2, 3 Group 4, 1	§5.1—5.2	§5.3—5.4 Group 5, 1	§6.1 Prob: 4.8, 5.24
4 / Feb 21	§6.2—6.3 HW Ch. 4,5 Group 6, 1	§7.1—7.2	§7.3—7.4 Group 7, 1	Review HW Ch 6	Exam #1 Chapters 1-6
5 / Feb 28	§8.1—8.2	§8.3—8.4 Group 8, 1	§9.1—9.2 Prob: Ch 7, 8	§9.3—9.5 HW Ch 7,8 Group 9, 1	§10.1—10.2
6 / Mar 7	§10.3—10.5 Group 10,1	§10.6—10.9 Group 10, 2	§11.1—11.2 Prob: Ch 9-10	§11.3-11.4 Group 11,1 HW Ch 9, 10	§11.4-11.5 Group 11,2
7 / Mar 14	§11.5 Group 11,3	§11.6 Group 11,4	§12.1—12.2 Prob: Ch 11	HW Ch 11 Review	Exam #2 Chapters 7-11
8 / Mar 21	Spring Break				
9 / Mar 28	§12.3—12.4 Group 12, 1	§12.5-12.6, 13.1—13.2	§13.3 Prob: Ch 12-13 Group 13, 1	§14.1—14.2 Group 14, 1	§14.3—14.4 HW Ch. 12, 13
10 / Apr 4	§14.5, 15.1	§15.2-15.3 Group 15, 1	Prob:Ch 14-15	§16.1—16.2	§16.3—16.5 HW Ch. 14, 15 Group 16, 1
11 / Apr 11	Feynman Lecture II Ch 15 (Especially Sections 4-5)	§17.1—17.3	§17.4 Prob Ch 16-17	§18.1—18.2 HW Ch. 16, 17	Easter Break
12 / Apr 18	§18.3 Group 18, 1	§19.1—19.2 Review	Exam #3 Chapters 12-17	§19.3—19.4 Group 19, 1	§20.1—20.3 Prob Ch 18-19
13 / Apr 25	§20.4—20.5 HW Ch. 18, 19	§20.6—21.2 Group 20, 1	§21.3 MAYDAY	§21.4 Prob Ch 20-21	Schroeder 1-3
14/ May 2	Schroeder 4-5 HW Ch. 20, 21	§20.6—21.1	§24.1—24.2 §24.5—24.6	§28.1—28.3	TBD
15 / May 9	TBD	TBD	Exam #4		FINAL: Tues May 17 8-10