# ECE 3318 Applied Electricity and Magnetism Spring 2024

# Class Number 10759

# Syllabus

## Course Time

Tu, Th 5:30 pm – 7:00 pm, S116 (Room 116 of the Science Building)

## Instructor

Prof. David R. Jackson; Office: W318-D3 Phone: 713-743-4426; Fax: 713-743-4444 E-mail: djackson@uh.edu

Information for the TA (grader) will be posted on the Canvas site.

**Note:** All policies indicated on this syllabus are subject to change. Notice of changes will be announced as quickly as possible through the class Canvas site. You are responsible for checking the Announcement section on the Canvas site often.

## **Class Canvas Site**

This class will use Canvas for the distribution of class material and assignments. You are responsible for checking the Canvas site often for announcements (found under the "Announcements" link). You are responsible for any information that is posted there. All of the homework and handouts will be posted on the Canvas site. The class lecture notes for this semester will also be posted on the Canvas site on a continuing basis.

# **Office Hours**

Office hours will be listed on the Canvas site. You are welcome to email or phone the instructor as well, especially if you have something private to discuss, but you are encouraged to ask questions in class so that everyone in the class can benefit.

## **Catalog Description**

Applied Electricity and Magnetism. Cr. 3. (3-0). Prerequisites: ECE 2202. Fundamentals of electricity and magnetism, vector calculus, Maxwell's equations, Kirchhoff's laws, static electric and magnetic fields, resistance, capacitance, inductance, magnetic circuits, and transformers.

# Academic Honesty Policy

Students in this course are expected to follow the <u>Academic Honesty Policy</u> of the University of Houston. It is your responsibility to know and follow this policy. You must

sign the "Academic Honesty and Syllabus Form" given by the instructor and return it to the instructor by Jan. 31, 2024. If you fail to do this, you may be dropped from the course. The policy may be found online at:

https://uh.edu/provost/policies-resources/honesty

## Email

Please check and use your Cougarnet email for communications related to this course. Faculty use the Cougarnet email to respond to course-related inquiries such as grade queries or progress reports for reasons of FERPA. To access your Cougarnet email, login to your Microsoft 365 account with your Cougarnet credentials. Visit University Information Technology (UIT) for instructions on how to connect your Cougarnet e-mail on a mobile device. It is your responsibility to configure your UH email alias properly in myUH (PeopleSoft) to receive email from the university.

The UIT website giving information about updating your UH email alias is:

http://www.uh.edu/infotech/services/accounts/email/update-student-address/index.php

## **Religious Holy Days**

Students whose religious beliefs prohibit class attendance on designated dates or attendance at scheduled exams may request an excused absence. To do this, you must request the excused absence, in writing, by Jan. 31, 2024. Please submit a written request to your instructor by this deadline to allow the instructor to make appropriate arrangements. For more information, please see the online *Student Handbook*.

## Students with Disabilities

Students with recognized disabilities will be provided reasonable accommodations, appropriate to the course, upon documentation of the disability with a <u>Student Accommodation Form</u> from the **Justin Dart, Jr. Student Accessibility Center**. To receive these accommodations, you must request them by submitting a request to the instructor in writing by Jan. 31, 2024. Students who fail to submit a written request will not be considered for accommodations. For more information, please see the online *Student Handbook*.

## **Recommended Texts**

- ✤ W. H. Hayt and J. A. Buck, *Engineering Electromagnetics*, 9th Edition, McGraw-Hill, 2019.
- ◆ L. C. Shen and J. A. Kong, *Applied Electromagnetism*, 3<sup>rd</sup> Edition, PWS, 1995.

Reading assignments will be posted on the class website from each of these two books. One copy of each text will be placed on reserve in the Library. Note that the Shen & King book is out of print, but you might be able to still find it by searching online.

# Electronic Version of Hayt & Buck Book

Due to special arrangements with the UH Bookstore, an electronic version of the Hayt &

Buck book is available for those who have opted into the BryteWave program.

# **Recommended Supplements**

In addition to the above EM textbooks, the following texts may be helpful to you in giving you additional supplementary material.

J. A. Edminister, *Schaum's Outline on Theory and Problems of Electromagnetics*, 2nd Ed., McGraw-Hill, 1993.

S. A. Nasar, *Schaum's Outline on 2000 Solved Problems in Electromagnetics*, McGraw-Hill, 1992.

H. M. Schey, *Div, Grad, Curl, and All That: an Informal Text on Vector Calculus*, 2<sup>nd</sup> Ed., W. W. Norton and Company, 1992.

M. R. Spiegel, Schaum's Outline on Vector Analysis, McGraw-Hill, 1959.

D. Fleisch, A Student's Guide to Maxwell's Equations, Cambridge University Press, 2008.

Note: One copy of each of the above books will be placed on reserve in the Library.

# Online Texts

In addition to the above traditional textbooks, an online textbook (two volumes) is available free of charge from the Open Textbook Library at the University of Minnesota. The textbook is: S. W. Ellingson, *Electromagnetics*, (vol. 1, 2018 and vol. 2, 2020) VT Publishing, Blacksburg, VA. The website is: https://open.umn.edu/opentextbooks/subjects/engineering.

Also, Students at UH have access to the McGraw-Hill online engineering library system called *Access Engineering* at <u>www.accessengineeringlibrary.com</u>. Two online books may be found there:

- Electromagnetic fields and Waves: Fundamentals of Engineering by S. M. Riad and Iman M. Salama, 2020.
- Schaum's Outline of Electromagnetics, 5<sup>th</sup> Edition, by M. Nahvi and J. A. Edminister, 2019.

When connecting from off campus, you can use the following link to reach the McGraw-Hill Access Engineering site, via the UH Library:

http://ezproxy.lib.uh.edu/login?url=https://www.accessengineeringlibrary.com

(Once you are at the site, you can search for these books.)

### Prerequisites

You must have earned a C- or better in ECE 2202 in order to be enrolled in ECE 3318: Waivers of this prerequisites are possible only through a petition. Please submit petitions to the ECE front office.

### **Grading Policy**

Grades will be determined on the basis of overall performance on the two regular exams, the final exam, homework, and the project, with the following <u>tentative</u> weights (subject to change):

Homework	10%
Project	10%
Exam 1	25%
Exam 2	25%
Final Exam:	30%

Any items that require re-grading must be brought to the TA or the instructor within one week from the time the item is returned in class. After that, grades will not be changed.

#### Homework Policy

Homework is due at the beginning of class on the due date (please submit a hard copy in class). NO LATE HOMEWORK IS ACCEPTED. Students are expected to work individually on the homework. Having general discussions with others about the concepts involved in the homework problems is allowed, and even encouraged. However, directly obtaining answers or derivations from anyone else, or copying from someone else's assignment, is not allowed. Also, students should not use homework answers or solutions from previous semesters or attempt to obtain homework answers or solutions from previous semesters. Violations of any of these rules will be considered a violation of the UH Academic Honesty Policy.

#### Exam Policy

No make-up exams will be given. If an extreme emergency prevents you from taking an exam on exam day, you must notify the instructor immediately (within 24 hours at the most) and provide documentation to verify the emergency. If the emergency is legitimate and documented, then you may be allowed to replace the missing exam grade with an extrapolated grade based on the grade you receive on the other exam and the final exam, as the instructor deems appropriate. You must take the final exam in order to pass the course.

#### Attendance

Attendance at every class is expected. Attendance will be taken during the semester. If you need to miss class for a legitimate reason, please obtain permission from the instructor at least one day ahead of time. Students who miss three classes (without getting an excused absence from the instructor before class) may be dropped from the course at any time, or receive a lower grade at the end of the semester.

## Withdrawal Policy:

The withdrawal dates are listed in the Academic Calendar. For Spring 2024 the last day to drop a course without receiving a grade is January 31. After this date and before April 17, you may drop with a W if you have not exceeded your total 6W limit. Do <u>not</u> assume that you will be dropped by the instructor if you stop attending class. You are responsible for completing the withdrawal procedure. After April 17 you are not allowed to drop the class.

Please be aware that students are only allowed to attempt required engineering courses (which includes required ECE courses) two times. Staying in a course past the first drop deadline (Jan. 31) constitutes an attempt.

Grades of Incomplete (I) will be given only when a small portion of the course has not been completed for a good reason that can be documented, such as a medical emergency. If all of the material has been completed, an "I" grade cannot be given. Detailed information about these issues is available in the online *Student Handbook*.

### Important Dates:

First day of classes: Jan. 16 (Tuesday) Last day to add a class: Jan. 23 (Tuesday) Last day to drop without receiving a grade: January 31 (Wednesday) Spring break: March 11–16 (Monday–Saturday) Last day to drop a course (with a W): April 17 (Wednesday) Last day of classes: April 29 (Monday) (Tuesday, April 30 is a make-up day.) Final exam: Tuesday, May 7, 4–6 pm

#### Useful Websites:

Department of ECE: http://www.ee.uh.edu College of Engineering: http://www.egr.uh.edu University of Houston: http://www.uh.edu Student Handbook: https://publications.uh.edu Undergraduate Student Catalog: https://publications.uh.edu Academic Calendar: https://publications.uh.edu Final Exam Schedule: http://www.uh.edu/academics/courses-enrollment/final-exam-schedules Course Listing: https://publications.uh.edu/content.php?catoid=49&navoid=18708

## Course Topics (not in chronological order)

#### 1) <u>Vector calculus</u>

- a) Coordinate systems
- b) Volume, surface and line integrals
- c) Divergence and the divergence theorem
- d) Curl and Stokes's theorem
- e) Gradient

#### 2) <u>Electrostatics</u>

- a) Charge and current
- b) Electric field and voltage drop
- c) Grounding
- d) Coulomb's law
- e) Superposition with Coulomb's law
- f) Electric flux
- g) Gauss' law
- h) Electrostatic properties of conductors and charge relaxation
- i) Potential calculations
- j) Kirchhoff's voltage law
- k) Integral and differential forms of electrostatic laws
- I) Poisson's and Laplace's equations
- m) Dielectrics
- n) Dielectric breakdown
- o) Boundary conditions
- p) Boundary value problems
- q) Image theory
- r) Capacitance and capacitors
- s) Electric stored energy
- 3) DC currents
  - a) Kirchhoff's current law
  - b) Ohm's law
  - c) Joule's law
  - d) Conductance and resistance calculations
  - e) Capacitance/Resistance analogy
- 4) Magnetostatics
  - a) The magnetic field and magnetic flux density
  - b) Integral and differential forms of Ampere's law and the magnetic Gauss law
  - c) Biot-Savart law
  - d) Magnetic materials
  - e) Boundary conditions
  - f) Magnetic stored energy
  - g) Inductance
  - h) Mutual inductance
  - i) Magnetic force and torque
  - j) Magnetic circuits
  - k) Transformers
  - I) Motors and generators

# UNIVERSITY POLICIES

## Security Escorts and Cougar Ride

UHPD continually works with the University community to make the campus a safe place to learn, work, and live. The security escort service is designed for the community members who have safety concerns and would like to have a Security Officer walk with them, for their safety, as they make their way across campus. Based on availability either a UHPD Security Officer or Police Officer will escort students, faculty, and staff to locations beginning and ending on campus. If you feel that you need a Security Officer to walk with you for your safety, please call <u>713-743-3333</u>. Arrangements may be made for special needs.

Parking and Transportation Services also offers a late-night, on-demand shuttle service called "Cougar Ride" that provides rides to and from all on-campus shuttle stops, as well as the MD Anderson Library, Cougar Village/Moody Towers and the UH Technology Bridge. Rides can be requested through the UH Go app. Days and hours of operation can be found at <a href="https://uh.edu/af-university-services/parking/cougar-ride/">https://uh.edu/af-university-services/parking/cougar-ride/</a>.

## **Mental Health and Wellness Resources**

The University of Houston has a number of resources to support students' mental health and overall wellness, including <u>CoogsCARE</u> and the <u>UH Go App</u>. UH <u>Counseling and</u> <u>Psychological Services (CAPS)</u> offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit <u>uh.edu/caps</u>, call 713-743-5454, or visit a <u>Let's Talk</u> location in-person or virtually. <u>Let's Talk</u> are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.

The <u>Student Health Center</u> offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.

The <u>A.D. Bruce Religion Center</u> offers spiritual support and a variety of programs centered on well-being.

## **Need Support Now?**

If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text 988, or chat 988lifeline.org.

# **Academic Honesty Policy**

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The <u>UH Academic Honesty Policy</u> is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

# **Title IX/Sexual Misconduct**

Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the <u>Title IX website</u>.

## Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: <a href="https://uh.edu/accessibility/">https://uh.edu/accessibility/</a> calling (713) 743-5400, or emailing <a href="https://uh.edu/accessibility/">idcenter@Central.UH.EDU</a>.

# **Excused Absence Policy**

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston <u>Undergraduate Excused Absence Policy</u> and <u>Graduate Excused Absence Policy</u> for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address

absences related to <u>military service</u>, <u>religious holy days</u>, <u>pregnancy and related</u> <u>conditions</u>, and <u>disability</u>.

## **Recording of Class**

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the <u>Justin Dart</u>, <u>Jr</u>. <u>Student Accessibility Center</u>. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.