**ECE 3300 – Introduction to Electromagnetics**

Fall Semester 2019 Monday and Wednesday 11:50-1:10 in WEB 1230

Canvas Page: **ece.utah.edu/~ece3300**

**Instructor:** Professor Cynthia Furse

**Email:** [cfurse@ece.utah.edu](mailto:cfurse@ece.utah.edu)

**Phone Number:** (801) 585-7234

**Office Hours:**  Monday and Wednesday 1:30-2:30

Additional Office Hours by TAs & Dr. Smith (volunteer experienced industry engineer) will be posted on the TA link on Canvas.

**Office Location:** MEB 2280 (SE corner of main floor, by the stairs and elevator)

**Required Materials**

F.T. Ulaby, Fundamentals of Applied Electromagnetics, Prentice Hall 2019

**Course Description**

Introduction to electromagnetics. Fundamentals of wave propagation,

transmission lines, impedance matching, electrostatics, magnetostatics, Maxwell's

equations, plane waves in free space, lossy media, and reflections from planar interfaces,

wireless communication systems. Electromagnetic safety. Applications include wireless

communication systems, high speed digital circuits, electromagnetic sensors, and

bioelectromagnetics. Prereq: Physics 2220, Math 2250, ECE 1240 (basic circuits).

**Course Outcomes**

At the conclusion of ECE 3300 you should be able to:

1. Calculate voltages, currents, and impedances on TEM transmission lines. This

will include time domain (TDR) analysis, frequency domain analysis (standing

waves and Smith charts), and power analysis.

2. Calculate electric and magnetic fields from a plane wave impinging on a metallic

or dielectric material from either normal or oblique incidence.

3. Design matching systems for transmission lines and plane waves.

4. Calculate the electric and magnetic fields from simple charge and current

distributions.

5. Compute the link budget for a simple wireless communication system and explain

how the environmental affects the received power.

6. Identify potentially hazardous electromagnetic environments.

**Teaching and Learning Methods -- FLIPPED CLASS (Step-by-Step) --**

***Step 1:*** 1-2 days BEFORE class ... ***Watch the lecture videos*** (OR read the textbook section).  Take notes that answer the Question of the Day. Bring them to class with you.

***Step 2: Come to class.*** Class will NOT be a repeat of the lecture. We will work together actively solving examples and some of your homework problems, and answering questions (so bring your questions with you).  And we will talk about how to apply what you are learning in real-world applications.  Teaching this way approximately doubles the amount of time we have together, and gives me time to work with you on the common problems that crop up in your homework.

***Step 3: Finish your homework THAT DAY***.  Even though it is not due until Monday night, finish the homework that day, so you will be well-prepared for the next day, which typically builds on the previous day.

**Grading:**

Midterm I or Final Part 1           25%

Midterm II or Final Part 2         25%

Midterm III or Final Part 3         25%

Homework                                10%

Labs                                       15%

Grades are assigned by the percentage total:

≥ 93%    A       ≥ 90%    A-

≥ 87%    B+     ≥ 83%    B      ≥ 80%    B-

≥ 77%    C+     ≥ 73%    C      ≥ 70%    C-

≥ 67%    D+     ≥ 63%    D      > 60%    D-

≤ 60%    E

**Exams:** Three midterm exams are scheduled as shown on the class schedule.  Please check your personal schedule to be sure that you do not have conflicts with these exams.  You must take exams on the day listed in the schedule unless you have a university excused absence or a documented medical emergency.

**The final exam is OPTIONAL.** It can be used to improve any or all of your midterm scores.  The final is broken into 3 parts, and each part is a 'retake' for one of the midterms.  You can retake any or all midterms during the final.  You will automatically receive whichever grade is higher -- the midterm or the equivalent retake on the final.

**Questions of the Day:** Each day a question(s) is assigned, which is what I want you to learn that day (no surprises here). Make notes in your own words on about one page.  Include anything you need from the book (like tables, equations, etc.). You will be able to use these notes on the exams, but will not be able to use your textbook. In class, or as you do your homework, add notes as needed.

**Homework:**Homework will be assigned with each lecture, and the combination of that week’s homework is typically due Monday night (see Canvas for details, and turn it in on Canvas).  All or most of the solutions are given.  PLEASE DO NOT SHARE THE SOLUTIONS OUTSIDE OF THIS CLASS!!!

**Lab:  Attendance in the lab is mandatory.** If you are traveling or have an emergency, contact Dr. Furse.  If you can’t reach me, just GO TO ANOTHER LAB that week.

**Permission codes and Waiting Lists:** Please fill out the [permission code request form](http://www.ece.utah.edu/forms) under ece.utah.edu/forms.

**Extra Credit:** Extra credit is available throughout the semester (See Canvas). Homework and Lab scores can be brought up to **a maximum of 100%** with extra credit. Extra credit cannot be added to exam scores.

**Extra Credit for Finding Errors:** If you find a mistake in the online lecture notes, textbook, solution manual, lab handouts, etc., email me the mistake (details, please, so I can fix it!) plus your corrections. You may receive extra credit for mistakes found.

**Work Load:** It is anticipated that a typical student will need to spend the following amount of time each week.  ***PLEASE plan your schedule so that you have time to learn the material.***

3 hours watching videos

3 hours in class

3 hours in lab

6-9 hours on homework

1-2 hours on prelab and write up

Additional time studying for exams.

**16+ hours per week**

**Food & Drink:** You are welcome to bring food and drink to the class, but please keep it simple to minimize distractions to your neighbors.

**Electronic Devices:**You are welcome to use tablets or other devices in class but not on the exams. If you take notes on a tablet, you will need to print them out for the exam.

**University Policies**

1. ***The Americans with Disabilities Act***. The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, (801) 581-5020. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in

an alternative format with prior notification to the Center for Disability Services.

1. ***University Safety Statement.*** The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.
2. ***Addressing Sexual Misconduct***. Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information.  If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066.  For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776.  To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).
3. ***Undocumented Student Support.*** Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.
4. ***Drop/Withdrawal***dates are set by the university. See the College of Engineering Guidelines:

<https://www.coe.utah.edu/students/current/semester-guidelines/>

1. ***Academic Misconduct (Cheating and Other Problems):***

ECE students are bound by the ECE Academic Misconduct Policy (See [www.ece.utah.edu/files/2019/01/ECE-Academic-Misconduct-Policy.pdf](http://www.ece.utah.edu/files/2019/01/ECE-Academic-Misconduct-Policy.pdf)) as well as the University’s Student Code (<http://regulations.utah.edu/academics/6-400.php>). Cheating on exams (using unauthorized materials, copying or collaborating with another student), and plagiarizing such as on lab reports (copying words, code, or work from another person without crediting it to them), constitute academic misconduct in this course and will result in academic sanction. Academic misconduct on any assignment may result in a sanction in this course up to failing the course.

1. ***Accommodation Policy*** (see Section Q): <http://regulations.utah.edu/academics/6-100.php>

The University of Utah seeks to provide equal access to its programs, services, and activities for people with disabilities. If you need accommodations in a class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union, 581-5020 (V/TDD) to make arrangements for accommodations. All written information in a course can be made available in alternative format with prior notification to the Center for Disability Services.

1. ***Student Success Resources exist*** to help you with academic, personal, and life issues. Please reach out to the Student Wellness Center, Student Success Advocates, Veterans Center, Women’s Resource Center, LGBT Resource Center, and our ECE advising staff.

Note: This syllabus is meant to serve as an outline and guide for our course. Please note that I may modify it with reasonable notice to you. I may also modify the Course Schedule to accommodate the needs of our class. Any changes will be announced in class and posted on Canvas under Announcements and/or changes to due dates of the course schedule.