

# EEE 161: APPLIED ELECTROMAGNETICS

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## In Workflow

1. EEE Committee Chair (pheedley@csus.edu)
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7. Dean of Undergraduate (james.german@csus.edu; celena.showers@csus.edu)
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9. Catalog Editor (torsetj@csus.edu)
10. Registrar's Office (w lindsey@csus.edu)
11. PeopleSoft (PeopleSoft@csus.edu)

## Approval Path

1. Fri, 12 Feb 2021 22:43:52 GMT  
Perry Heedley (pheedley): Rollback to Initiator
2. Fri, 10 Sep 2021 21:52:41 GMT  
Perry Heedley (pheedley): Approved for EEE Committee Chair
3. Fri, 17 Sep 2021 21:37:41 GMT  
Mahyar Zarghami (mahyar.zarghami): Approved for EEE Chair
4. Fri, 24 Sep 2021 16:39:51 GMT  
Mohammed Eltayeb (mohammed.eltayeb): Approved for ECS College Committee Chair
5. Fri, 24 Sep 2021 16:59:52 GMT  
Behnam Arad (arad): Approved for ECS Dean

Date Submitted: Sat, 08 May 2021 01:56:10 GMT

**Viewing: EEE 161 : Applied Electromagnetics**

**Last edit: Fri, 10 Sep 2021 21:48:17 GMT**

Changes proposed by: Milica Markovic (101025232)

### Contact(s):

Name (First Last)	Email	Phone 999-999-9999
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### Catalog Title:

Applied Electromagnetics

### Class Schedule Title:

Applied Electromagnetics

### Academic Group: (College)

ECS - Engineering & Computer Science

### Academic Organization: (Department)

Electrical and Electronic Engineering

### Will this course be offered through the College of Continuing Education (CCE)?

No

### Catalog Year Effective:

Fall 2022 (2022/2023 Catalog)

### Subject Area: (prefix)

EEE - Electrical and Electronic Engineering

### Catalog Number: (course number)

161

**Course ID: (For administrative use only.)**

200946

**Units:**

4

**In what term(s) will this course typically be offered?**

Fall, Spring

**Does this course require a room for its final exam?**

Yes, final exam requires a room

**Does this course replace an existing experimental course?**

No

**This course complies with the credit hour policy:**

Yes

**Justification for course proposal:**

The only substantive change on this form is the removal of a programming course (CSC 25) as a prerequisite. The original reason for this requirement was that some laboratory assignments may use MATLAB. Experience has shown that students can learn to perform the necessary basic functions within the MATLAB environment given the time available in the laboratory. The emphasis of EEE 161 is Electromagnetics (see course description below). Because of the role of EEE161 in the curriculum, the programming requirement may cause an unnecessary delay in a student's progress towards the degree.

**Course Description: (Not to exceed 80 words and language should conform to catalog copy.)**

Review of vector calculus. Electrostatic fields from lines, surface and volume charges by Coulomb's law, Gauss' law, Laplace's and Poisson's equations. Capacitance. Magnetostatic field calculations using Biot-Savart's law and Ampere's law. Inductance. Forces on moving charges. Magnetic materials. Electric and magnetic energy in fields. Faraday's law. Ideal transformer. Moving conductor in time-varying magnetic field. Displacement current. Charge-current continuity relation. Transmission line analysis, characteristic impedance, reflection coefficient and standing wave concepts. Smith Chart, matching problems. Lecture three hours, lab three hours.

**Are one or more field trips required with this course?**

No

**Fee Course?**

No

**Is this course designated as Service Learning?**

No

**Does this course require safety training?**

No

**Does this course require personal protective equipment (PPE)?**

No

**Does this course have prerequisites?**

Yes

**Prerequisite:**

MATH 32, MATH 45, PHYS 11C, and ENGR 17.

**Prerequisites Enforced at Registration?**

Yes

**Does this course have corequisites?**

No

**Graded:**

Letter

**Approval required for enrollment?**

No Approval Required

**Course Component(s) and Classification(s):**

Discussion  
Laboratory

**Discussion Classification**

CS#04 - Lecture /Recitation (K-factor=1 WTU per unit)

**Discussion Units**

3

**Laboratory Classification**

CS#16 - Science Laboratory (K-factor=2 WTU per unit)

**Laboratory Units**

1

**Is this a paired course?**

No

**Is this course crosslisted?**

No

**Can this course be repeated for credit?**

No

**Can the course be taken for credit more than once during the same term?**

No

**Description of the Expected Learning Outcomes: Describe outcomes using the following format: "Students will be able to: 1), 2), etc."**

By the end of this course, students should be able to do the following:

- 1) Apply complex numbers, phasors, vector algebra, differential equations, and integral calculus to electromagnetics problems.
- 2) Visualize and solve for forward, reflected, and total voltage, current, and power on a transmission line.
- 3) Justify the design of an impedance matching circuit appropriate to a specific application.
- 4) Apply Maxwell's Equations to various practical situations to derive and calculate static and changing electromagnetic fields.
- 5) Communicate effectively with the instructor and peers, and employ metacognitive strategies when reading and studying.

By the end of the lab

- 1) Effectively read the substrate data sheets to design transmission lines
- 2) Design circuits using practical considerations and major high-frequency design tool, the Advanced Design System (ADS), and Ansys High Frequency Structure Simulator (HFSS).
- 3) Write a concise technical report.

**Attach a list of the required/recommended course readings and activities:**

2021Applied Electromagneticsv2.docx

**Assessment Strategies: A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above.**

Class assessments

Midterm (Summative Assessment) aligns to class SLO 1-3

#1 Online multiple-choice midterm Exam: 100pts (10% of the grade)

#1 Midterm take-home project report: 90pts (9% of the grade)

Final (Summative Assessment) aligns to class SLO 4

#1 Online final exam: 100pts (10% of the grade)

#1 Final take-home project report: 90pts (9% of the grade)

Assignments throughout the semester (Formative Assessments)

#20+ Written quizzes (TL, SC, IM, ES, MS, CF) - 5pts each, best 20, total 100 pts (10% of the grade) align to SLO 1-4

#4 Individual end-of module online quizzes - up to one per module: points vary per quiz, total 100pts (10% of the grade) align to SLO 1-4

#4 Group homeworks in Perusall: 10 pts each, total 40 pts (4% of the grade) aligns to SLO 5

#30-50 Watching Videos: 1-2 pts each, 50 pts (5% of the grade) aligns to SLO 1-4

~#13 "Beginning of Week Discussions" Individual weekly posts - Reflection to assigned reading and videos: 5 pts each, best 10, total 50 pts (5% of the grade) aligns to SLO 5

~#26 "One minute summary" - after every class - 1-2 pts each, total of 30 pts (3% of the grade). aligns to SLO 5

Lab Assessments

6 Group laboratory Reports ADS: 60pts (6% of the grade) align to SLO 1-3  
Individual midterm take-home lab exam: 50pts (5% of the grade) aligns to SLO 1-2  
Practical Lab, Antenna Project Report: 90pts (9% of the grade) aligns to SLO 1-3  
Patch antenna fabrication: 50pts (5% of the grade) aligns to SLO 2

**Is this course required in a degree program (major, minor, graduate degree, certificate?)**

Yes

**Has a corresponding Program Change been submitted to Workflow?**

No

**Identify the program(s) in which this course is required:**

**Programs:**

BS in Electrical and Electronic Engineering

**Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer)?**

No

**Will there be any departments affected by this proposed course?**

No

**I/we as the author(s) of this course proposal agree to provide a new or updated accessibility checklist to the Dean's office prior to the semester when this course is taught utilizing the changes proposed here.**

I/we agree

## **University Learning Goals**

**Undergraduate Learning Goals:**

Competence in the disciplines

**Is this course required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?**

No

## **GE Course and GE Goal(s)**

**Is this a General Education (GE) course or is it being considered for GE?**

No

**Reviewer Comments:**

**Perry Heedley (pheedley) (Fri, 12 Feb 2021 22:43:52 GMT):** Rollback: 1. The prereqs should be enforced. 2. Mismatch between syllabus and Form A for ELO's and assessment percentages. 3. Need to add alignment between ELO's and assessments 4. assignment percentages need to add up to 100%. 5. Catalog description needs to mention lab.

Key: 1696