Minnesota State University, Mankato  
Curriculum Proposal

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU’s curricular process for recommendations and decisions.

(Check all that apply):

| College: Science, Engineering and Technology | Proposal #: 140 |
| Department: Electrical and Computer Engineering and T | Effective Date of Change: |
| Program: Electrical and Computer Engineering | Academic Year: 06-07 |
| Type of Change: COURSE PROPOSALS | (For Office Use Only) |
| Proposed: Change in Credits |

Title Current: Engineering Electromagnetics

Title Proposed: Engineering Electromagnetics

24-Char. Abbrev: Eng Electromagnetics

Course Designator

| Number of |
| Credits |
|---|---|
| EE350 | 4 |
| EE350 | 3 |

(course applicable)

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):

Course description should remain the same

Prerequisites: EE 231, Math 321, Math 223, Physics 222

Rationale or Justification for change:
The need to more completely balance content across all department courses

***For General Education or Cultural Diversity Courses Only***

<p>| General Education Course: |</p>
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<th>GE Category #</th>
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- For Writing intensive Courses, attach a description of the kind and quantity of writing.
- For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:

a. Syllabus or course outline.

b. Course’s student learning outcomes associated with each GE competency or CD designation.

c. List of strategies to be used to assess students’ achievement of each GE competency or CD designation.

***For New Courses***

| Instructional Type: Lecture |
| Course will be offered: |
|---|---|
| Grading Format: √ Grade | Fall Semester |
| | P/N | Spring Semester |
| | Electrical Engineering and Computer Engineering | Summer Session |

Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:

a. Syllabus or course outline.

b. Course’s student learning outcomes.

c. A list of resources required to offer and support this course.

d. A description of how teaching this course will affect department staffing.

e. If 400/500 level course, an explanation of added expectations of graduate students.
**Signature Page**

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Revised September 2002
Proposed EE 350 Engineering Electromagnetics Syllabus
Spring Semester 200?

Instructor: Dr. R.A. Nair
Office: TR-S136
Phone: 389-2061
Email: ra.nair@mnsu.edu

References: Field and Wave Electromagnetics-by David K. Cheng

Objectives: To educate students with knowledge of the laws governing the electric and magnetic field essential to the understanding of the operation of electric and magnetic instruments and machines. Also to acquire the concepts of the basic theory of electromagnetic wave propagation for long distance communications, and the signal transmission through transmission lines and the use of Smith chart for impedance matching.

Course Contents:
Vector analysis
Static electric fields
Solution of electrostatic problems
Steady electric currents
Steady magnetic fields
Time-varying fields
Plane Electromagnetic Waves
Transmission lines

Grading Method:
Final letter grade will be based on the performance in all the following categories.
Quizzes: ..................................10% (closed book & 10-15 min each)
Homework: ............................10% (assigned homework are required to be submitted on time within one week of finish of relevant chapters)
Tests: .................................40% (closed book, approx. 50 min each)
Final Examination: ............40% (comprehensive and closed book)

Regularity in attendance is expected. Quiz and homework points can be adjusted to credit for regularity in attendance.
Anticipated Course Schedule:

Week 1: Introduction; Vector Algebra: vector addition, dot and cross products of vectors
Reading assignment: Pages 1-21 Homework: Chapter 2, Problems. 2, 3, 7

Week 2: orthogonal coordinate systems, gradient, divergence, and curl of a vector,
Reading assignment: Pages 21-48 Home work: chapter 2, Problems.15, 17, 18  quiz 1

Week 3: Divergence theorem, Stokes theorem, Helmholtz's theorem. Reading
assignment: Pages 48-65 Homework: Chapter 2, Problems. 21, 23, 27 More problems
will be discussed in class      Test 1

Weeks 4 & 5: Static Electric Fields: Coulomb's law, Gauss's law and its applications,
Electric potential, Conductors in static fields, dielectrics in static fields, Electric Flux
density and dielectric constant, boundary conditions.
Reading assignment: Pages 72-115 Homework: Chapter 3, problems. 2,3,6, 10, 13
More problems will be discussed in class.   Quiz 2

Weeks 6 & 7: Capacitance and capacitors, electrostatic energy and forces Solution of
Electrostatic problems: Poisson's and Laplace's equations, method of images, Boundary
value problems in Cartesian, cylindrical and spherical coordinates.
Reading assignment: Pages 116-142 Homework: Chapter 3, problems: 17, 20, 27, 31
Test 2 More problems discussed in class

Weeks 8 & 9: Steady electric currents: current density and Ohm's law, electromotive
force and KVL, equation of continuity and KCL, power dissipation and Joule's law,
Resistance calculations.
Reading assignment: Pages 150-169 Homework: chapter 4, problems 1, 2, 3, 7, 8, 9, 12
Quiz 3 Test 3

Week 10: Static magnetic fields: Lorentz force equation, Maxwell's equations for static
magnetic fields, vector magnetic potential, Biot-Savart law, The magnetic dipole and
magnetization vector, magnetic field intensity and permeability
Reading Assignment: Pages 170-222 Homework: Chapter 5, Problems. 4,10, 11, 12.
Weeks 11&12: Time-varying fields and Maxwell's equations, Plane electromagnetic
waves. Reading assignment: pages 228- 310 Homework: Chapter 6, Problems 5, 6, 7, 14,
15, 17; Chapter 7, problems 5, 7, 9, 20 More problems discussed in class.  Quiz 4

Weeks 13 &14: Transmission lines, The smith chart
Reading assignment: Pages 336- 381 Test 4 (4 /8/) Homework: Chapter 8, problems 8, 9,
11, 19, 20, 23,24 More problems discussed in class

Week 15: Waveguides and cavity resonators, Fundamentals of antennas.
Reading Assignment: Pages 386-448 Quiz 5
Test 5 Homework  Chapter 9, Problems12, 14, 15; chapter 10, problem 4, 5.

Final Examination

No make up requests for quiz, test or final exam will be allowed. No eating or drinking in
the class is allowed. Home works are to be done neat and legible and should be stapled
before submission on time.
EE 350 Engineering Electromagnetics (3) – Outcomes

Upon completion of the course students will have the ability to:

1. Deal with Vector quantities in any 3-dimensional coordinate system.

2. Learn the concepts and laws pertaining to Electrostatics, and the solution of electrostatics problems, and polarization of materials.

3. Analyze steady electric currents.

4. Learn steady magnetic fields, and magnetization of materials.

5. Understand time varying fields and Maxwell’s equations.

6. Learn and analyze plane electromagnetic wave propagation.

7. Understand and analyze the wave propagation through transmission lines for power delivery.

8. Understand Smith chart and learn its use for solution of transmission line problems and impedance matching.

9. Understand the basics of wave guides and cavity resonators.

10. Acquire the basic understanding of how an antenna radiates power over a long distance.
EE 350  Engineering Electromagnetics
(Spring Semester 2005)
Instructor:  Professor Ramakrishna A. Nair
Office:  TRS-136
Phone:  2061
publication, 2004
References:  Field and Wave Electromagnetics- David K. Cheng
Objectives:  To educate students with knowledge of the laws governing the electric and magnetic field
esential to the understanding of the operation of electric and magnetic instruments and machines. Also to
acquire the concepts of the basic theory of electromagnetic wave propagation for long distance
communications, and the signal transmission through transmission lines and the use of Smith chart for
impedance matching.
Course Contents (with anticipated learning Schedule):
Waves and Phasors (3hr)
Transmission lines (8hrs)
Vector analysis (6hrs)
Static electric fields (6hrs))
Solution of electrostatic problems (6hrs)
Magnetostatics or Steady magnetic fields (6hrs)
Maxwell’s equations /Time-varying fields (6hrs)
Plane Electromagnetic waves (6hrs)
Wave reflections, Transmissions and geometric optics (4hrs)
Waveguides and cavity resonators (3)
Radiation and Antennas (4 hrs)
Grading Method:
Final letter grade will be based on the performance in all the following categories.
Quizzes (closed book, 10-15 minutes each) -- ------10%
Home: ------ 10%
(Assigned homeworks are required to be submitted on time agreed upon.)
Tests:  (closed book, approximately 50 minutes each) ------ 40%
Final Examination: comprehensive and closed book ------ 40%

Anticipated Course Schedule
Week 1 (1/18-21): Introduction: Waves and Phasors
Reading assignment: Pages 1-24
Homework: Chapter 1, Problems. 1, 3, 8,11,18
Week 2&3 (1/24 -2/4): Transmission lines, Smith Chart, Impedance matching
Reading assignment: Pages 34-80
Home work: chapter 2, Problems. 3,7,11,16,23,24,30,32,39,41,42,45,49
Week 4(2/7-11): Vector Algebra, orthogonal co-ordinate system , gradient of a scalar,
Reading assignment: Pages 100-120
Homework: Chapter 3, Problems. 5, 7,19,28,37,38,40,41,48
More problems will be discussed in class

Static Electric Fields: Coulomb’s law, Gauss’s law and its applications, Electric potential, Conductors in
static fields, dielectrics in static fields, Electric Flux density and dielectric constant, boundary conditions.
Reading assignment: Pages 100-
Homework: Chapter 3, problems. 2,3,6, 10, 13
More problems will be discussed in class.

Quizz 2 (2/12/04)
Weeks 7(2/28-3/4): Capacitance and capacitors, electrostatic energy and forces
Solution of Electrostatic problems: Poisson’s and Laplace’s equations, method of images, Boundary value
problems in Cartesian, cylindrical and spherical coordinates.
Reading assignment: Pages 116-142
Homework: Chapter 3, problems: 17, 20, 27, 31
More problems discussed in class
Reading assignment: Pages 150-169
Homework: chapter 4, problems 1, 2, 3, 7, 8, 9, 12 Quiz 3 (3/4/04)

Spring break (3/8-12)

Week 10 (3/22-26)
  Static magnetic fields: Lorentz force equation, Maxwell's equations for static magnetic fields, vector magnetic potential, Biot-Savart law, The magnetic dipole and magnetization vector, magnetic field intensity and permeability

Reading Assignment: Pages 170-222
Homework: Chapter 5, Problems 4, 10, 11, 12.
Reading Assignment: pages 228-310
Homework: Chapter 6, Problems 5, 6, 7, 14, 15, 17; Chapter 7, problems 5, 7, 9, 20
More problems discussed in class Quiz 4 (3/25/04)

Weeks 13 & 14 (4/5-16): Transmission lines, The smith chart

Reading Assignment: Pages 336-381
Homework: Chapter 8, problems 8, 9, 11, 19, 20, 23, 24
More problems discussed in class

Reading Assignment: Pages 386-448 Quiz 5 (4/22/04)
Homeworks: Chapter 9, Problems 12, 14, 15; chapter 10, problem 4, 5.

Week 17 (5/3-7): Final Examinations
Your final Examination is on-------
No make up requests for quiz, test or final exam will be allowed.
No eating or drinking in the class is allowed.
Home works are to be done neat and legible and should be stapled before submission on time.
Resources required to support EE350

c. Resources to support this course will result from allocation of existing department resources and with the assistance of the College of Science Engineering and Technology to support and growth and advancement of ECET programs.

d. Staffing resources to support this course will result from allocation of existing department resources and with the assistance of the College of Science Engineering and Technology to support and growth and advancement of ECET programs.