MASTER COURSE OUTLINE
Prepared By: Jim Hamm Date: September 2017

COURSE TITLE
Engineering Physics III with Lab

GENERAL COURSE INFORMATION

Dept.: PHYS&	Course Num: 223	(Formerly:)
CIP Code: 40.0801	Intent Code: 11	Program Code:
Credits: 5		
Total Contact Hrs Per Qtr.: 66		
Lecture Hrs: 44	Lab Hrs: 22	Other Hrs: 0
Distribution Designation: Lab Science LS		

COURSE DESCRIPTION (as it will appear in the catalog)
The third in a three-quarter calculus-based sequence in introductory physics intended for students majoring in science or engineering. Course content includes static electricity, current electricity, magnetism, and special relativity.

PREREQUISITES
Successful completion of PHYS& 221 and PHYS& 222.

TEXTBOOK GUIDELINES
A calculus-based Engineering Physics textbook, such as *University Physics* by Young and Freedman.

COURSE LEARNING OUTCOMES
Upon successful completion of the course, students should be able to demonstrate the following knowledge or skills:

1. Apply problem-solving techniques learned in Engineering Physics I (PHYS& 221) to electricity, magnetism, and special relativity.
2. Apply Coulomb's law in basic one- and two-dimensional situations.
3. Calculate electric fields and electric potential for different charge configurations, up to and including certain continuous charge distributions.
4. Determine the behavior of charges in uniform electric fields.
5. Apply the concepts of electric potential energy and electric potential in the solution of problems.
6. Apply material learned in the study of electric field and electric potential to the subject of capacitors.
7. Apply Ohm's law, Kirchhoff's rules, and the concepts of energy and power to DC circuits.
8. Determine the behavior of point charges and current-carrying conductors in uniform magnetic fields.
9. Calculate magnetic fields for moving single charges and elementary current configurations.
10. Employ Faraday's law for calculations involving induced emf.
11. Perform calculations for time dilation and length contraction.
12. Employ the relativistic Lorentz transformations.
13. Perform elementary relativistic calculations for momentum, energy, and the Doppler effect.
14. Present clearly explained problem solutions.

15. Present experimental results in clearly written laboratory reports.

INSTITUTIONAL OUTCOMES

IO2 Quantitative Reasoning: Students will be able to reason mathematically.

COURSE CONTENT OUTLINE

Electricity
- Coulomb's law
- Electric fields
- (Optional) Gauss's law
- Electrical potential
- Capacitance
- Current and resistance
- Direct current circuits

Magnetism
- Behavior of charges and currents in magnetic fields
- Sources of the magnetic field
- (Optional) Ampere's law
- Faraday's law
- (Optional) Inductance

Relativity
- Time dilation and length contraction
- Lorentz transformations
- Relativistic momentum and energy
- The Doppler effect

DEPARTMENTAL GUIDELINES *(optional)*

Exams and Quizzes 50-60% Homework 20-30% Laboratory Reports 20%
PO5 should be assessed: Students will be able to solve problems by gathering, interpreting, combining and/or applying information from multiple sources.

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DIVISION CHAIR APPROVAL **DATE**