WASHINGTON STATE UNIVERSITY
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School of Engineering and Computer Science

ECE 370: Electromagnetic Fields and Waves
Master Syllabus

Catalog Data:	**ECE 370: Electromagnetic Fields and Waves**; 3 credits Electrostatic and magnetostatic fields; Faraday's laws, Maxwell's equations, electromagnetic properties of matter, uniform plane waves and transmission lines.
Class Schedule:	Three lecture hours per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	ECE 260, MATH 315
Prerequisites by Topic:	1. Calculus, linear algebra, differential equations 2. Understanding of voltage, current, charge concepts 3. Previous exposure to the fundamental laws of electricity and magnetism
Typical Text(s):	Fawwaz T. Ulaby and Umberto Ravaioli, *Fundamentals of Applied Electromagnetics, 7th Ed.*, Pearson, 2015.
Typical Reference(s):	Mathew N. O. Sadiku, *Elements of Electromagnetics*, Oxford University Press, 2001
Course Coordinator:	Dr. Tutku Karacolak
Course Objectives:	1. Understand Maxwell's equations 2. Calculate electromagnetic field distributions 3. Learn electromagnetic fields, charges, currents 4. Apply 3-dimensional calculus and electrostatic boundary value problems 5. Understand basic units (charge, voltage, current) 6. Understand field concepts underlying common electrical components (inductors, capacitors, resistors, and transistors)
Topics Covered:	1. Electromagnetic Model, Vector Analysis Review 2. Coulomb's law and electric field 3. Gauss's law, Laplace, Poisson's equations and applications 4. Capacitance and Capacitors 5. Steady Electric Currents 6. Conductors and dielectrics in static electric field 7. Electric flux density and dielectric constant 8. Boundary conditions for electrostatic fields 9. Electrostatic energy and forces 10. Boundary-value problems 11. Current density and Ohm's law 12. Joule's law, boundary conditions, resistance 13. Vector magnetic potential 14. Magnetic dipole, magnetization 15. Magnetic field intensity, magnetic circuits 16. Magnetic materials, boundary conditions, inductance 17. Time varying fields 18. Maxwell's equations

Lab Experiments and Activities:		None		
Course Outcomes:	Students will be able to:			
	Assessed for Student Outcomes	1-a. Demonstrate knowledge of Gauss's, Coulomb's, Ampere's, Faraday's laws and principles of transmission lines. 1-c. Use appropriate models to formulate solutions for time varying fields, electrostatic energy/forces, magnetic field intensity, plane wave theory, and transmission lines. 1-d. Apply mathematics (integral calculus, differential equation, linear algebra, complex variables) to obtain analytical solutions of Maxwell's equations and electromagnetic wave propagation.		
	Other			
Relationship of Course to Program:		Meets: Educational Objectives 1 Student Outcomes 1		
Prepared by:		Dr. Tutku Karacolak	Date:	March 2, 2018; reviewed 10/2011 Reviewed 02/12