LEHIGH UNIVERSITY

Department of Physics
Lewis Laboratory
16 Memorial Drive East
Bethlehem, PA 18015-3182
(610) 758-3930 Fax (610) 758-5730
http://www.physics.lehigh.edu

August 17, 2020

Physics 422-Electricity and Magnetism II, Fall 2020

Instructor: Yong W. Kim (Office: Rm LL403)
Email: ywk0; Office Phone: #8-3922
Place: On-line
Time: 10:45AM-11:35 AM on Monday, Wednesday and Friday

Topical Content of the Course
- Maxwell's Equations
- Physics and Geometry of Differential Operators
- Review of Electrostatics and Magnetostatics
  (Roughly corresponding to Jackson Chapters 1-5)
- Wave Equation and Gauge Transformation
- Macroscopic Fields in Materials; Energy and Momentum
- Reflection and Refraction
- Radiating Systems
- Scattering and Diffraction
- Collision between Charged Particles
- Radiation by Moving Charges
- (Optional Additional Topics)

Recommended Texts
- J. D. Jackson, Classical Electrodynamics, 3rd ed. (John Wiley & Sons, 1999)
- David Tong, Lecture Notes- Electricity &Magnetism II, Cambridge University

Other References:
- R.G. Brown, Lecture Notes- Classical Electrodynamics Part II, Duke University
- David Griffiths, Introduction to Electrodynamics, 3rd ed. (1999)

Assignments and Examinations
- Weekly assignments, each due a week from the date of assignment
- Mid-semester exam: Hour Exam (75 min)
- One (or possibly two) term paper(s) (equivalent to an Hour Exam)
- Final oral examination (45 minutes; equivalent to two Hour Exams)

Grading:
- Homework, 20%; Hour Exam, 20%; and Term Paper(s), 20%; Final Exam, 40%

Final expected competencies at the end of the course:

- Students have gained fundamental understanding of the Maxwell equations as pertain to time-dependent motion of electric charges and accompanying electromagnetic radiation;
- Have gained proficiency with applying Maxwell's equations to a distribution of electric charges and associated electromagnetic fields for given geometry of material media and boundaries between them;
- Have experienced working with the mathematical techniques for solving the Maxwell equations;
- Have gained understanding of electromagnetic wave phenomena, including the interaction between charged particles and wave-particle interactions;
- Have learned how to treat the motions of charged particles when they become relativistic; and
- **Have gained improved verbal skills to describe each E&M phenomenon, argue the mathematical representation of the problem and reconcile the formal solutions with phenomenology.**

Accommodations for Students with Disabilities: *If you have a disability for which you may be requesting accommodations, please contact your instructor and the Office of Academic Support Services, Williams Hall, Suite 301 (610-758-4152) early in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.*

Academic Integrity

Please read the sample vignettes of how University's policy on academic integrity applies in different circumstances at the website: http://www.lehigh.edu/lts/official/Academic_Integrity_Vignettes.pdf

Lehigh University endorses ***The Principles of Our Equitable Community***

[http://www.lehigh.edu/~inprv/initiatives/PrinciplesEquity_Sheet_v2_032212.pdf]. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment in and outside the classroom.