**Bulletin Description:** Review of Maxwell's equations, radiation, collisions between charged particles, dynamics of relativistic particles and fields.

**Instructor:** Erik K. Hobbie, Batcheller Technology Center, Rm. 251  
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**Lectures:** TTh 12:34-1:45 PM  
South Engineering, Rm. 221

**Office Hours:** TTH 2:30-3:30 PM

**Text:** Textbook - Classical Electrodynamics, Third Edition, J. D. Jackson

**Goals:** This represents the canonical graduate level physics course in electricity and magnetism. The emphasis is on a theoretical description of the statics and dynamics of electromagnetic fields. As taught by this instructor, the course naturally splits into three chronological themes; electrostatics, electrodynamics, and particles/fields. The material will be presented with an emphasis on materials and nanotechnology. The mathematical tools (most notably Green’s functions) required for a quantitative treatment of electrodynamics will be developed.

**Grading:** Grading will be based on a combination of attendance and homework (40 %), two midterm exams (20 % each for a total of 40 %), and a final exam (20 %). The tentative grading scale will be > 80 % (A), 70 - 80 % (B), 60 - 70 % (C), 50 - 60 % (D), < 50 % (F).

**Topics:**  
Week 1 (Aug. 25, 27); Introduction and review; Electrostatics (Jackson, Ch. I-1)  
Week 2. (Sept. 1, 3); Electrostatics and boundary value problems (Jackson, Ch. 1-2)  
Week 3. (Sept. 8, 10); Boundary value problems (BVPs) (Jackson, Ch. 2)  
Week 4 (Sept. 15, 17); BVPs continued (Jackson, Ch. 2-3)  
Week 5 (Sept. 22, 24); Special functions and related expansions (Jackson, Ch. 3)  
Week 6. (Sept. 29, Oct. 1); BVPs, multipoles and dielectric media (Jackson, Ch. 3-4)  
Week 7 (Oct. 6, 8); Maxwell equations (Jackson, Ch. 6), Midterm I  
Week 8 (Oct. 13, 15); Macroscopic dynamic formalism (Jackson, Ch. 6)  
Week 9 (Oct. 20, 22); Plane waves (Jackson, Ch. 7)  
Week 10 (Oct. 27, 29); Wave propagation and causality (Jackson, Ch. 7)  
Week 11 (Nov. 3, 5); Radiation (Jackson, Ch. 9)  
Week 12 (Nov. 10, 12); Scattering and diffraction, Midterm II (Jackson, Ch. 10)  
Week 13 (Nov. 17, 19); Scattering, special relativity (Jackson, Ch. 10-11)  
Week14 (Nov. 24, TGH); Relativistic particles/fields (Jackson, Ch. 11-12)  
Week 15 (Dec. 1, 3); Radiation from moving charges (Jackson, Ch. 14)
All work in this course must be completed in a manner consistent with the NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct.

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty.

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible.