

Fall 2007
MWF 10:30-11:20
RCB5100

PHYS 821
Electromagnetic Theory

Prof. Andrei Frolov
frolov@sfu.ca
P8456 / 782-3787

COURSE DESCRIPTION:

Advanced course in electromagnetic theory: review of Maxwell's equations and special relativity; formulation of electrodynamics as a classical field theory; radiation, propagation, and scattering of electromagnetic waves. *More advanced topics if time permits.*

RECOMMENDED TEXTBOOKS:

- *Classical Electrodynamics*, J. D. Jackson (2nd or 3rd Ed.)
- *The Classical Theory of Fields*, L. D. Landau and E. M. Lifshitz (4th Ed.)

TOPICS:

- Symmetries of Maxwell's equations and special relativity
- Vectors, tensors, and introduction to differential geometry
- Relativistic particles and electromagnetic fields
- Covariant formulation of electrodynamics
- Action, field equations, and electromagnetic waves
- Radiation by moving charges
- Scattering of electromagnetic waves
- *Magnetohydrodynamics and force-free approximation*
- *Quantum effects: pair production by electric field*
- *Applications to astrophysics: pulsar spin-down*

GRADING:

Your progress will be marked on absolute scale. At the end of the course, assignment and exam marks will be combined in a weighted average, from which the final grade will be derived (with thresholds to be determined by me). The relative weights are:

Assignments (every other week)	50%
Mid-term (take-home)	15%
Final exam (open-book)	35%

Assignments are to be handed in on a due day by beginning of the class. Late assignments are accepted, but will be penalized at 5% of the mark per day late. *Late exams will not be accepted.* Failure to submit an assignment or attend an exam will result in zero marks. Attendance of lectures is at your discretion, but no notes will be provided.