

# Course Outline: PHYS509 – Plasma Physics Winter 2013

UNIVERSITY OF CALGARY  
DEPARTMENT OF PHYSICS and ASTRONOMY

1. **Lecture: L01:** TuTh, 12:30-13:45, SS 117

**Instructor:** Dr. David Knudsen; Tel. 403-220-8651; [knudsen@ucalgary.ca](mailto:knudsen@ucalgary.ca)

**Office:** SB638; **Office Hours:** By appointment

Course website (Blackboard): **PHYS 509 L01 - (Winter 2013) - Plasma Physics**

Physics and Astronomy Office location and phone: SB605; 403-220-5385

2. **PREREQUISITES:** PHYS343, PHYS455

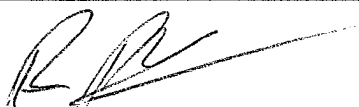
3. **GRADING:** The University policy on grading and related matters is described sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

Assignments (6)	40%
Midterm test	20%
Final Examination	40%

A table of conversion from final course percentage to final course letter grade will be published on the Blackboard site later in the term.

4. **Missed Components of Term Work.** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in section 3.6: <http://www.ucalgary.ca/pubs/calendar/current/sc-3-6.html>. It is the student's responsibility to familiarize himself/herself with these regulations. See also <http://www.ucalgary.ca/pubs/calendar/current/e-3.html>.
5. **REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME-ACTIVITY.** If you have a clash with this out-of-class-time-activity, please inform your instructor as soon as possible so that alternative arrangements may be made for you.
6. **TEXTBOOK:** Introduction to Plasma Physics with Space and Laboratory Applications by Donald A. Gurnett and Amitava Bhattacharjee, Cambridge University Press, 2005.
7. **EXAMINATION POLICY:** Exams will be open book; calculators allowed. Students are encouraged to read the Calendar, Section G, on Examinations: <http://www.ucalgary.ca/pubs/calendar/current/g.html>.

Department Approval



Date

Jan 9/13

## 8. OTHER IMPORTANT INFORMATION FOR STUDENTS:

- (a) **ACADEMIC MISCONDUCT** (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under K. Student Misconduct (<http://www.ucalgary.ca/pubs/calendar/current/k.html>) to inform yourself of definitions, processes and penalties
- (b) **ASSEMBLY POINTS** in case of emergency during class time. Be sure to **FAMILIARIZE YOURSELF** with the information at <http://www.ucalgary.ca/emergencyplan/assemblypoints>.
- (c) **ACADEMIC ACCOMMODATION POLICY.** Students with documentable disabilities are referred to the following links:  
Calendar entry on students with disabilities: <http://www.ucalgary.ca/pubs/calendar/current/b-1.html>  
Disability Resource Centre: <http://www.ucalgary.ca/drc/>
- (d) **SAFEWALK:** Campus Security will escort individuals day or night (<http://www.ucalgary.ca/security/safewalk/>). Call 220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.
- (e) **FREEDOM OF INFORMATION AND PRIVACY:** This course will be conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPPA). As one consequence, **students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page.** For more information see also <http://www.ucalgary.ca/secretariat/privacy>.

(f) **STUDENT UNION INFORMATION:** VP Academic Phone: 220-3911 Email: [suvpaca@ucalgary.ca](mailto:suvpaca@ucalgary.ca).  
 SU Faculty Rep. Phone: 220-3913 Email: [sciencerep@su.ucalgary.ca](mailto:sciencerep@su.ucalgary.ca) Website <http://www.su.ucalgary.ca/home/contact.html>.  
 Student Ombudsman: <http://www.su.ucalgary.ca/services/student-services/student-rights.html>

(i) **INTERNET and ELECTRONIC COMMUNICATION DEVICE Information.** You can assume that in all classes that you attend, **your cell phone should be turned off.** Also, communication with other individuals, via laptop computers, Blackberries or other devices connectable to the Internet is not allowed in class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

## 9. COURSE OUTLINE (approximate):

Dates	Week #	Topic	Chapter
Jan 8 & 10	1	Introduction and Background. Debye shielding.	1 & 2
Jan 15 & 17	2	Single particle motions – Static, uniform E & B	3
Jan 22 & 24	3	Single particle motions – Spatially-varying B	3
Jan 29 & 31	4	Single particle motions – Time-varying B and E	3
Feb 5 & 7	5	Maxwell's equations and EM wave propagation	various
Feb 12 & 14	6	Wave propagation; group and phase velocity; dispersion	4
Feb 19 & 21	Reading Week	No lectures	
Feb 26 & 28	7	Mid-term exam Feb 26. Feb 28 topic TBD.	
Mar 5 & 7	8	Waves in cold, unmagnetized plasma	4
Mar 12 & 14	9	Waves in cold, magnetized plasma	4
Mar 19 & 21	10	Distribution functions; Boltzmann and Vlasov Eqns	5
Mar 26 & 28	11	Moment equations; pressure waves; collisional effects	5
Apr 2 & 4	12	Resistive MHD; magnetic pressure; convection	6
Apr 9 & 11	13	Magnetohydrodynamic waves; magnetic reconnection	6
Apr 16		TBA	