

A9611B: The Interstellar Medium

Winter Term, 2012-2013

Instructor: Prof. Els Peeters

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Office hours: After class or by appointment. I can also be reached during the week through e-mail for simple inquiries, or to make an appointment. I will try to reply to e-mails within two working days of reception.

Content: Introduction to the nature and physics of the interstellar medium. Topics covered include a wide range of microscopic and macroscopic physical and chemical processes that determine the properties, dynamics, and behaviour of the interstellar medium. Emphasis on the underlying (astro)physical concepts, and their connections to actual astronomical observations of the interstellar medium.

Pre-requisites: Astronomy 9610A: Introduction to Modern Astrophysics.

Time and Location: Tuesday 9:00–10:30 in PAB Room 26 and Thursday 9:00–10:30 in PAB Room 106.

Website: <http://owl.uwo.ca>. Course notes, problem sets, and course marks will be distributed through the course site on Sakai OWL.

Textbook: A. G. G. M. Tielens, *The Physics and Chemistry of the Interstellar Medium* (Cambridge: Cambridge University Press), 2005. (QB790.T54 2005) *required*

A very useful additional resource is the textbook by B. Draine, *Physics of the interstellar and intergalactic medium* (Princeton University Press), 2011 (QB790.D73 2011)

Both textbooks are on reserve in the Taylor Library.

Outline: Topics covered in this course:

- Introduction
- Gas cooling & heating
- Chemical processes
- Dust
- PAHs
- HII regions
- ISM Phases

- PDRs
- Molecular clouds
- Shocks

Course content may vary.

Evaluation: The grade assigned for this course will be based on:

- problem sets (best 4 of 5), 40%
- midterm, 30%
- final exam, 30%

The Department of Physics and Astronomy may, in rare cases, adjust the final course marks in order to conform to Departmental policy.

The pass standard for this course is at least 60% overall on all course components and at least 50% on the weighted average of the midterm and final exam.

Your assignments grade will be based on your best 4 (out of 5) assignments.

Problem Sets (PS): are to be submitted *in class* on the due dates given in the schedule.

Please write down the course number on your submission. To help the TA grading the assignments avoid any conflict of interest, we ask that you identify your work with a numeric code that we will assign, rather than with your name or student number. Because only the best 4 of 5 problem sets are used to compute the final mark, late assignments will not be accepted. While you are encouraged to discuss your approaches to the assigned problems with your classmates, your solutions should represent your own original work.

Remember that clarity is essential for getting partial or full credit for problems. Make sure you show all steps leading to your final answer. Finally, remember to include the appropriate units for any numerical answer and take care of the significant digits.

Calendar: The schedule for this course is:

- Problem Sets are due on Jan. 24, Feb. 7, Feb. 28, March 21, April 4.
- Midterm is set for March 7.
- Final exam: early in the April exam period.

Final exam: The final exam covers all of the course material and will be scheduled for early in the April exam period.

Travel: No make-up exams will be given to accommodate travel.

Additional information: The following textbooks are available in Taylor Library (not on reserve) and may provide additional background.

1. *An Introduction to Modern Astrophysics*, 2nd ed., 2007, B.W. Carroll & D.A. Ostlie (QB461.C35x): Chapter 9 on radiative transfer

2. *The Interstellar Medium*, 2005, J. Lequeux (QB790.L4713; online access:
<http://www.springerlink.com.proxy2.lib.uwo.ca:2048/content/q23652/?MUD=MP>)
3. *The Physics of the Interstellar Medium*, 2010, J.E. Dyson & D.A. Williams (QB790.D97)
4. *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei*, 1989, D.G. Osterbrock (QB855.55.O88)
5. *Astrophysical Concepts*, 4th ed., 2006, M. Harwit (QB461.H37)

Scholastic Offences: Scholastic Offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf.

Accessibility: Please contact me if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.