ASTRONOMY 3302A: The Interstellar Medium
2015-2016: fall term

General Information

- **Lectures:**
  Tuesdays 9:30am–10:30am and Thursdays 9:30am–11.30am; Rm 34 PAB
- **Instructor:**
  Prof. Els Peeters
  Rm 206 PAB
  phone: 661-2111 ext. 80973
  epeeters [at] uwo.ca
- **Office hours:**
  Mondays 1:30pm–2:30pm (starting September 21).
  I can also be reached immediately after class and 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.
- **Teaching assistant:**
  Matt Shannon
  mshann3 [at] uwo.ca
- **Course website:**
  Sakai OWL: http://owl.uwo.ca
- **Texts, readings, materials:**
  - Required textbook: "The physics of the interstellar medium" by Dyson & Williams, 2nd ed. The textbook is on reserve in the Taylor Library.
  - Supplementary reading: Additional reading will be held on reserve in the Taylor Library or referenced on the course webpage.
  - Additional textbooks on reserve in the Taylor Library:
    "An Introduction to Modern Astrophysics" by B.W. Carroll & D.A. Ostlie, 2nd ed., 2007

Course Philosophy

The interstellar medium (ISM) is the "stuff between the stars" and includes cold and molecular gas as well as hot and ionized gas, dust grains, magnetic fields, radiation, and cosmic rays. The goal of this course is to understand how the interesting physics at play (including atomic, molecular, gas-phase, and gravitational physics) determines the energetics, composition, and structure of the ISM.

Course Description

- **Calendar description:**
  Introduction to the nature and physics of interstellar matter. Topics covered include a wide range of microscopic and macroscopic physical 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. Prerequisites: Astronomy 2201A/B, 2801A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

- **Outline of topics covered:**
  - Introduction to the ISM
  - The Interaction of Light and Matter
  - Microscopic Processes in the ISM
  - Interstellar dust
  - HII regions
  - Gas dynamics
  - Star formation

  Course content may vary.

- **Mark distribution:**
  - Assignments: 30%
  - Two quizzes: 30%
  - Final exam: 40%

  In order to pass the course, you must attain a grade of at least 50% on the weighted average of the quizzes and the final exam. Unless you achieve this criterium, your maximum grade in this course will be 40%.

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

  Your assignments grade will be based on the report (Assignment #4) and your best 4 (out of 5) problem-set assignments.

  Any errors, or appeals to your scores, must be reported to your instructor within two weeks of their initial posting.

- **Description of examinations:**
  - Two 1-hour quizzes (short answers, essays and problems; closed book)
  - One 3-hour final (short answers, essays and problems; cumulative; closed book)

Course Calendar/Schedule

- Assignments are due *in class* on Sept. 24; Oct 6, 20; Nov. 3, 10; Dec. 1.
- Quizzes: Thursday Oct. 15 & Tuesday Nov. 24 in class.
- Final exam: during the December exam period. Details to be announced.
- Last day to drop this course: November 5

Assignments

There are 6 assignments for this course: 5 of them will be problem sets and one will be a report (#4). This report is mandatory.

Report: Prof. Dr. A.G.G.M. Tielens is an expert on the interstellar medium. He will be giving a colloquium on Thursday, October 22, 2015 entitled *Astrochemistry: Putting the astro in astrobiology.* The time is 2:30–3:30pm in the Seminar Room (PAB 100). You are required to attend his talk. Your assignment is to write a short summary (500–1000 words) of Dr. Tielens talk. Details to be announced.

Course policies & friendly reminders from UWO:

- Students are expected to come to class prepared, to bring a calculator and to work through exercises (alone or in groups).
- The course website will be the only medium where course materials are distributed, announcements are made and where you can access your marks for various components of this course. It is your responsibility to check this website frequently.
- Assignments must be turned in at the requested date **in class**. Remember that clarity is essential for getting partial or full credit for problems. Please 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.
- Working together: Students are encouraged to work on problem sets together. However, the work that is handed in must be an honest representation of your own effort and understanding.
- Missed assignments: The assignments grade is based on the report (Assignment #4) and your best 4 (out of 5) problem-set assignments. Since this schedule allows you to skip one problem-set assignment without penalty, no make-up problem-set assignments will be provided.

  If you're unable to attend Dr. Tielens talk, please contact me. If permission is granted, you can summarize one of his paper from a selected list (to be announced).

  If you are ill for an extended period of time, you must provide documentation to the Associate Dean, Faculty of Science as soon as possible.
- A basic scientific calculator (e.g. the Sharp EL-510RB calculator used for first year physics courses) is allowed during the quizzes and exams.
- Missed quizzes or final exam: Documentation must be provided to the Dean's Office in order for you to receive permission to write a make-up (see item on "medical or other serious circumstances" below). Note that if you fail to write a scheduled Special Examination, permission to write another Special Examination will be granted only with the permission of the Dean in exceptional circumstances and with appropriate supporting documents. In such a case, the date of this Special Examination of a final exam normally will be the scheduled date for the final exam the next time the course is offered.

  Students needing to make travel arrangements are advised to book a travel date after the end of the examination period. No make up exams will be given to accommodate travel!
- Accessibility: Please contact the course instructor 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.

- Medical or other serious circumstances: If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately.

  For UWO Policy on Accommodation for Medical Illness, see:
  http://www.uwo.ca/univsec/handbook/appeals/accommodation_medical.pdf. A student requiring academic accommodation due to illness should use the Student Medical Certificate [see:
  https://studentservices.uwo.ca/ under the Medical Documentation heading for a downloadable SMC] when visiting an off-campus medical facility, or request a Records Release Form (available in the Dean's Office) for visits to Student Health Services. Students seeking academic accommodation on medical grounds for any missed tests, exams, participation components and/or assignments worth 10% or more of their final grade must apply to the Academic Counseling office of their home Faculty and provide documentation. Academic accommodation cannot be granted by the instructor or department.

- Academic misconduct:

  Cheating: Cheating 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_undergrad.pdf

  If you are caught cheating, there will be no second warning. Cheating includes having available any electronic devices other than an approved calculator. You may not have a cell phone, PDA etc. accessible during tests or exams, not even to use it as a calculator.

  Plagiarism: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar).

  All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

- Religious holidays: Please see the link below for the University's policy on accommodation for religious holidays. http://www.uwo.ca/univsec/handbook/appeals/accommodations_religious.pdf

Advice for successful performance:

This is a challenging class that will require you to apply many different types of physics in novel ways. You are advised to do the reading, participate in class, and work through the assignments to succeed in this course. If you encounter difficulties in doing the homework assignments, ask your fellow students, the TA or me for help.

Estimation of student workload: Expect to spend 10-15 hours (including class time) per week on this course alone.