

ASTRONOMY 9604A :

Galactic and extragalactic infrared astronomy

FALL 2007

General Information

- **Lectures:**
Wednesday 9.30-11.30am & Friday 9.30-10.30am; chartroom in PAB
- **Instructors:**
Prof. Pauline Barmby; Rm 318 P&A; phone : 661-2111 ext. 81557; e-mail : pbarmby-at-uwo.ca
Prof. Els Peeters; Rm 213 P&A; phone: 661-2111 ext. 80973; e-mail : epeeters-at-uwo.ca
- **Course Website:**
accessible through WebCT : <http://owl.uwo.ca> (not yet available)
temporary website : <http://www.astro.uwo.ca/~epeeters/courses/a9604a/>
- **Office Hours:**
Prof. Barmby : Monday 10.30-11.30am, Thursday 2.30-3.30pm, or by appointment
Prof. Peeters : Tuesday 2.00-3.00pm, or by appointment.
- **Textbook:**
“Handbook of infrared astronomy” by I.S.Glass
plus additional readings (via photocopy or on reserve at Taylor Library)

Course Description

- **Calendar description :** Techniques and methods of infrared astronomy, including imaging, spectroscopy and interferometry with ground- and space-based instrumentation. Application to research in star formation, the interstellar medium, nearby galaxies, and the high-redshift universe. 3 lecture hours/week. Half course; one term.
- **Outline of topics to be covered :**
 - The Infrared Sky
 - IR detectors & Photometry
 - Spectroscopy
 - Dust
 - H + fine-structure lines
 - Continuum emission
 - H₂ and molecules
 - PAHs and ices
 - topics in IR astronomy (guest lectures)
- **Description of examinations :**
There will be no formal final exam, but students will present their major projects (see below) during the final exam period on a date to be chosen by consultation with class members.

- **Description of assignments :**

In most weeks there will be small assignments related to that week's lecture topic(s). These will be distributed via the OWL site and will generally be due on Fridays. All will involve a writing component and in some cases your results will form part of the "notes" for the course.

Assignment # 1: The IR Sky. In the second week of class, students will help to present some of the basic information for the course in short (10–15 minute) presentations with PowerPoint or on the board. The idea is to give you some practice in making presentations on subjects you may already be somewhat familiar with. Topics to be covered are: nomenclature for the electromagnetic spectrum, the Wien law for black bodies, comparison of infrared observatory locations (ground, South Pole, airborne, space), and summarizing major infrared surveys. We'll distribute the topics at the first class meeting; presentations will be on Wednesday, September 12.

In addition, there are 2 larger projects, described in detail below.

Project #1: Select a paper from the "Spitzer Space Telescope" special issue of *Astrophysical Journal Supplements* (2004 *ApJS* volume 154, number 1: you can browse the issue using the ADS) and present it to the class on Oct. 24. Everyone will pick a different paper; we'll discuss our choices a couple of weeks in advance to make sure that there are no duplications. Everyone will read all the papers, and each student will lead a 20-minute discussion on their paper (what's often called a "journal club"). The discussion leader will present the main points of the paper: what are the authors trying to do? how are they doing it? what are the results and are they convincing? Powerpoint is not necessary, although it can be helpful to have the figures (and sometimes tables) from the paper on a few slides, so that everyone can look at them at once.

Marks will be based on:

- quality of paper summary
- quality of oral presentation
- discussion leadership AND participation

Project #2: Write an observing proposal for a topic of your choice which uses an IR instrument. Formatting instructions for the relevant observatory and limits on number of pages, figures, etc should be obeyed. The 'technical plan' part of the proposal is required, but the detailed observation specification (e.g. AORs for *Spitzer*) is not. The proposal does not have to be officially submitted (but it can be: ask the instructors for help if you want to do this.)

There will be several steps to this project. A few weeks into the term, you should have a general idea of what you are interested in observing. On Sept. 28 we will have a class session to discuss ideas and give feedback; the following week (Oct. 5) you should come prepared for a more detailed discussion of your own and others' projects. A draft proposal is due on Nov. 16. These exercises (on Sept. 28, Oct. 5 and Nov. 16) are intended to help you get going on the project, and are not for marks. The final written version of the proposal is due in early December, and all students will present their proposal in a class session during the December exam period.

Marks will be based on:

- scientific justification: explanation of the problem and importance
- technical quality: feasibility, efficiency of proposed observations
- compliance with proposal requirements
- quality of oral presentation
- participation in presentation discussion
- originality of proposal concept

Possible observatories/instruments and their proposal deadlines:

- Spitzer: <http://ssc.spitzer.caltech.edu/> (Nov 16 2007)
- Gemini: <http://www.gemini.edu/> (late Sept, late Mar)
- CFHT: <http://www.cfht.hawaii.edu/> WIRCAM (mid-September, mid-Mar)
- HST: <http://www.stsci.edu/hst/> (Mar 28 2008)

A good place to start working on ideas is to browse the abstracts of accepted proposals for these facilities, which you can do at the websites listed above. Your instructors are happy to discuss ideas with you, and we will also try to hand out some example proposals.

References/citations should be consistent with the ApJ reference style guidelines : <http://www.journals.uchicago.edu/ApJ/information.html>; manuscript preparations and instructions; Instructions for preparing specific aspects of an ApJ paper; References.

• **Assignment schedule:**

Assignment	Due date	oral	written
basic infrared info	12 Sept.	x	
photometry	28 Sept.		x
proposal idea, article	28 Sept.	x	
proposal discussion	5 Oct.	x	
spectroscopy	12 Oct.		x
dust	19 Oct.		x
article presentations	24 Oct.	x	
H+fine-structure	2 Nov.		x
continuum emission	9 Nov.		x
proposal draft	16 Nov.		x
H2 and molecules	23 Nov.		x
PAHs and ices	30 Nov.		x
observing proposal	Early Dec.(TBA)	x	x

• **Mark distribution :**

Weekly assignments	45%
Article presentation	15%
Proposal	40%

Course Calendar/Schedule

- Last day to add this course : September 14
- Last day to drop this course : October 15
- Assignment due dates : see above

Course policies

- Attendance at lectures is required.
- Missed assignments: assignments are generally due on Fridays. Advanced permission must be received for a delayed due date, and we reserve the right to refuse permission and/or penalize late assignments.

- Missed final presentation: all students must present their final projects on a date chosen by consensus. Documentation must be provided to the instructors to get permission to present on a different date, and marks may be adjusted to reflect extra preparation time.
- Religious holidays: we will attempt to schedule presentations and class activities to avoid religious holidays; please inform the instructors if you foresee problems with the current schedule. See the University's Academic Handbook for the full policy.
- Academic misconduct:

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 offense. For more details, see <http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf>.

All required papers may be subject to submission to 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>).