PHYS-4520H-A: Astrophysics: Galaxies and Cosmology 2018FA - Peterborough Campus

Instructor:

Instructor: David Patton

Email Address: dpatton@trentu.ca

Phone Number: 705-748-1011 x7462

Office: SC 320

Office Hours: Mondays 11:00-12:00; Thursdays 15:00-16:00.

Meeting Times:

Lectures will take place in SC 317 on Tuesdays 12:00-12:50 and on Fridays 16:00-17:50.

Department:

Academic Administrative Assistant: Colleen Berrigan

Email Address: physics@trentu.ca

Phone Number: 7715

Office: SC327

Description:

An introduction to modern astrophysics, which applies the principles of physics to the study of galaxies and cosmology. Topics include the Milky Way galaxy, the nature of galaxies, galaxy evolution, the structure of the universe, active galactic nuclei and quasars, cosmology, and the early universe.

Learning Outcomes:

Upon successful completion of this course, the student will have

- a general understanding of the fundamentals of astrophysics, including the spatial and temporal extent of our universe, and the basics of stellar evolution
- a conceptual and mathematical understanding of the structure, dynamics, makeup, and history of our Milky Way galaxy
- a good overview of the properties of galaxies in general, and an understanding of how properties such as morphology, stellar content, metallicity and gas content are related to one another
- a basic understanding of the key physical mechanisms by which galaxies evolve
- knowledge about the structure of the universe and the tools used by astronomers to measure distances
- a clear understanding of the physical mechanism which drives nuclear activity in active galaxies and quasars, and the evidence which has led us to this interpretation
- a working knowledge of cosmology, including an appreciation of how astronomers have been able to measure the age of the universe and predict its ultimate fate
- the ability to use particle physics to understand the early universe, shortly after the Big Bang
- the mathematical ability to solve a range of problems in astrophysics
- the ability to solve some astrophysics problems using a computational approach

Texts:

None.

Assessments, Assignments and Tests:

In-class Quizzes

There will be approximately five in-class quizzes during the term. These quizzes will test your understanding of the material covered in the preceding lectures. Quiz questions will include multiple choice and short answer questions. Please bring a calculator. Quiz dates will be announced during the preceding class and on Blackboard.

Assignments

There will be approximately six assignments during the term. These assignments are designed to deepen your understanding of topics covered during class. Assignments will include a variety of questions, including astrophysics problems, analysis of observational and simulation data, and review of published papers.

Late Policy

5% of the grade on the assignment will be deducted for every day that an assignment is late (including weekends and holidays). Assignments will not normally be accepted more than one week beyond the due date. Assignments may be submitted electronically in order to avoid or minimize late penalties, but in that case an identical paper copy must still be submitted for grading within 2 business days.

Midterm Exam

There will be a two hour midterm exam during class on **Friday Oct. 19**. The midterm exam will contain a mix of shorter questions (which are more conceptual in nature) and longer questions

(which consist of more involved problems).

Final Exam

There will be a three hour final exam during the exam period. The final exam will contain a mix of shorter questions (which are more conceptual in nature) and longer questions (which consist of more involved problems).

Grading:

5% Quizzes

35% Assignments

20% Midterm Exam

40% Final Exam

Note on Passing Grade: Regardless of the overall grade calculated above, an average of at least 40% on the quizzes, midterm exam and final exam (weighted as above) must be obtained to pass this course. Otherwise a grade of no more than 45% (F) will be assigned.

Grade Total by Withdrawal Date:

At least 25% of the grade will be determined and made available by the final date for withdrawal from this course.

Schedule:

The following outline shows the order in which we will cover each topic, and provides a rough estimate of when we will cover each topic. I will provide regular updates in class and will communicate clear expectations as to which topics will be covered in upcoming quizzes, assignments or exams. This further emphasizes the importance of regularly attending the lectures.

- Week 1: Introduction to Galaxies and Cosmology
- Weeks 2-3: The Milky Way Galaxy
- Weeks 4-6: The Nature of Galaxies; Midterm Exam
- Weeks 7-8: Galaxy Evolution
- Week 9: Active Galaxies and Quasars
- Weeks 10-12: Cosmology

Course Guidelines:

Blackboard

We will use Blackboard in a number of ways, including access to the syllabus, lecture notes, assignments, formula sheets, web links, grades, calendar, announcements, etc. Blackboard can be accessed by logging into mytrent. An introduction to this content will be provided during the first lecture.

University Policies:

Academic Integrity

Academic dishonesty, which includes plagiarism and cheating, is an extremely serious academic offence and carries penalties varying from failure on an assignment to expulsion from the University. Definitions, penalties, and procedures for dealing with plagiarism and cheating are set out in Trent University's *Academic Integrity Policy*. You have a responsibility to educate yourself – unfamiliarity with the policy is not an excuse. You are strongly encouraged to visit Trent's Academic Integrity website to learn more: www.trentu.ca/academicintegrity.

Access to Instruction

It is Trent University's intent to create an inclusive learning environment. If a student has a disability and documentation from a regulated health care practitioner and feels that they may need accommodations to succeed in a course, the student should contact the Student Accessibility Services Office (SAS) at the respective campus as soon as possible.

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