

**Principles of Astrophysics**  
**01:750:341**  
**Fall 2020**

Instructor: Professor Saurabh W. Jha

Summary: Introduction to Astrophysics. Newtonian gravitation related to the solar system, binary stars, and the galaxy, gravitational lensing, special and general relativity, and cosmology.

Pre-requisites: 01:750:204 or 01:750:227 or 01:750:272 and Calc 2 01:640:152 (required for astrophysics majors) or 01:640:136.

This course is required for astrophysics majors.

This course is not a pre-requisite for 01:750:342, it maybe taken before or after 342.

Meeting times: Two 80 minute lectures per week.  
T-Th 5 (3:20 pm – 4:40 pm)

Text: Principles of Astrophysics, by Keeton

LMS: Canvas

Provisional Plans for Remote Instruction:

Lectures will be recorded (asynchronous) ahead of time, and students will be required to have viewed the lectures in advance of a synchronous class meeting time. There may be online quizzes (via Canvas) to check that students have watched the lectures. Class time will be used for synchronous discussion (also via Canvas) about the lecture; this discussion will be recorded for students who are unable to attend the virtual discussion sections.

Weekly problem sets will be assigned, to be turned in on Canvas. Exams will include a take-home midterm and a take-home final, both to be turned in on Canvas. Virtual office hours will be offered on a fixed schedule, but also by arrangement. Students will also be able to interact via Canvas tools like discussion forums and the chat room.

Technology requirements: Students will need to be able to watch lecture videos via Canvas. Students will need to convert written assignments into PDF form for submission via Canvas; there are a number of free apps that can do this with a mobile device camera, or else students can use a scanner.

Provisional Grading Plans:

Weekly problem sets (lowest score dropped): 60%

Canvas quizzes: 10%

Mid-term exam: 10%

Final Exam: 20%

Schedule (provisional):

Week 1: Introduction, dimensional analysis

Week 2–3: One-body problem in Newtonian gravity (Solar system, Galactic center)  
Week 4–6: Two-body problem in Newtonian gravity (binary stars, extrasolar planets)  
Week 7–9: N-body problem in Newtonian gravity (spiral and elliptical galaxies)  
Week 10: Gravitational lensing  
Week 11–12: Special and general relativity (black holes)  
Week 13–14: Cosmology

#### Academic Integrity:

Students are expected to maintain the highest level of academic integrity. You should be familiar with the university policy on academic integrity: <http://academicintegrity.rutgers.edu/academic-integrity-policy/> Violations will be reported and enforced according to this policy.

Use of external sources to obtain solutions to homework assignments or exams is cheating and is a violation of the University Academic Integrity policy. Cheating in the course may result in penalties ranging from a zero on an assignment to an F for the course to expulsion from the University. Posting of homework assignments, exams, recorded lectures, or other lecture materials to external sites without the permission of the instructor is a violation of copyright and constitutes a facilitation of dishonesty, which may result in the same penalties as explicit cheating.

Not only does the use of such sites violate the University's policy on Academic Integrity, using such sites interferes with your achievement of the learning you are paying tuition for. Assignments, quizzes, and exams are given not simply to assign grades, but to promote the active learning that occurs through completing assignments on your own. Getting the right answer is much less important than learning how to get the right answer. This learning is critical to your success in subsequent courses and your careers.

#### **Student wellness Services**

Student Counseling, ADAP & Psychiatric Services (CAPS) wellness for non-emergency psychological health issues services (848) 932-7884, 17 Senior Street, New Brunswick, NJ 08901  
<http://health.rutgers.edu/medical-counseling-services/counseling/>

Violence Prevention & Victim Assistance (VPVA), (848) 932-1181, 3 Bartlett Street, New Brunswick, NJ 08901, <http://www.vpva.rutgers.edu/>

Office of Disability Services (848) 445-6800, Lucy Stone Hall, Suite A145, Livingston, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854, <https://ods.rutgers.edu/>

Scarlet Listeners for confidential peer counseling and referral hotline, (732) 247-5555,  
<http://www.scarletlisteners.com>