

SFSU Physics 722: Astrophysics

Prof. Joseph Barranco

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Thornton 308

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Lectures: MWF 09:10-10:00, TH 428

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Course Overview

This course is an introduction to theoretical astrophysics at the level of senior undergraduates or beginning graduate students. We will first cover radiative processes in astrophysics (fundamentals of radiative transfer, basic theory of radiation fields, radiation from moving charges, bremsstrahlung, synchrotron radiation, Compton scattering), which we then apply to selected topics in accretion power in astrophysics (accretion in binary systems, accretion disks, accretion onto compact objects, active galactic nuclei, etc.).

Lectures & Office Hours

Lectures: MWF 09:10–10:00, Thornton 428

Office Hours: Anytime! I have no scheduled office hours this semester. Please feel free to drop by whenever you like. If I am busy, I will let you know when I am available. I am also happy to set-up a scheduled appointment if you would like something more concrete.

Textbooks

Required:

- (1) Rybicki & Lightman, Radiative Processes in Astrophysics
- (2) Frank, King & Raine, Accretion Power in Astrophysics

Optional:

- (3) Carroll & Ostlie, Introduction to Modern Astrophysics
- (4) Shu, The Physics of Astrophysics, Volume I: Radiation
- (5) Shu, The Physics of Astrophysics, Volume II: Gas Dynamics

Prerequisites

This is not etched in stone; please see me if you are concerned about your readiness for this course. Ideal preparation includes intermediate mechanics (Physics 330), intermediate electrodynamics (Physics 360 & 460), thermodynamics & statistical mechanics (Physics 370), quantum mechanics (Physics 430), and mathematical methods (Physics 385 & 785). Astronomy 420 (stellar physics) would also be very useful.

Assignments & Grades

- (1) Problem sets: 50 %
- (2) Two oral exams: 20 %
- (3) Review paper or computational project: 30 %.

Policy on Collaboration

You are strongly encouraged to discuss course material with your fellow classmates. When working on problem sets, first try to solve the problems on your own. Struggle. Struggle some more. If you get stuck, feel free to discuss overall methods and approaches with your classmates, but not the details! Your written solutions should be solely your own, and should be written-up in isolation from your fellow classmates. Copying is strictly prohibited.

Expected Code of Conduct

Classroom discussion and participation are strongly encouraged. However, please refrain from unrelated chatter. Also, please remember to place cell phones and other electronic communication devices on silent or vibration mode so as not to distract your fellow classmates. If you must arrive late or leave early, please sit toward the back of the room near the doors so as to minimize disruption.

Disability Access

Students with disabilities who need reasonable accommodations are encouraged to contact me early in the semester. The Disability Programs and Resource Center is available to facilitate the reasonable accommodations process. The DPRC, located in Student services Building 110, can be reached by phone at 415-338-2472 (voice/TTY) or by e-mail at dprc@sfsu.edu.