

SYLLABUS

PHYS 4650 Introduction to Modern Astrophysics

Fall 2026

Professor: Dr. Ohad Shemmer

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Class: TR 11:10–12:30 (Phys 116)

Recitation: R 1:50–2:45 (Phys 116)

Office: EESAT-220C

Office Hours: R 10:00–11:00, or by appointment

Prerequisites: PHYS 3010

Text Book: “An Introduction to Modern Astrophysics”, B. W. Carroll and D. A. Ostlie (Pearson, Addison Wesley, 2nd. edition, 2007).

Course Content: This course provides an introduction to the basic concepts and methods of modern astrophysics and cosmology. Topics include the energy source of the Sun, stellar structure and evolution, black holes, as well as the structure and fate of the Universe.

Exams: There will be a mid-term and a final examination.

Homework: Homework sets will be assigned weekly.

Project: In-class presentation (~ 15 minutes) on an assigned topic. Selected topics include: Supernovae, Gamma-Ray Bursts, Tidal Disruption Events, Active Galactic Nuclei, Extrasolar Planets, Cosmic Microwave Background Radiation, Intergalactic Medium, Multi-Messenger Astrophysics. Assigned topic must be selected by 9/17/2026.

Grading:	Homework	25%
	Project	25%
	Mid-Term Exam ^a	20%
	Comprehensive Final Exam ^b	30%
	Total	100%

^aon 10/8/2026, 11:10am–12:30pm

^bon 12/10/2026, 10:30am–12:30pm

SCHEDULE

Week	Topic
Aug. 17	Celestial Mechanics
Aug. 24	Light and Telescopes
Aug. 31	The Interaction of Light and Matter
Sep. 7	The Classification of Stellar Spectra
Sep. 14	The Energy Source of the Sun
Sep. 21	Stellar Structure
Sep. 28	Stellar Parameters
Oct. 5	The Interstellar Medium and Star Formation
Oct. 12	Stellar Evolution
Oct. 19	White Dwarfs, Neutron Stars, and Black Holes
Oct. 26	The Milky Way Galaxy
Nov. 2	Galaxies: Structure and Evolution
Nov. 9	Active Galaxies ¹
Nov. 16	Cosmology ¹
Nov. 30	Structure and Evolution of the Universe ¹

¹ Including presentations of assigned projects

Unauthorized Aids During Examinations and Assessments

Students may use only those materials and resources that are expressly authorized by the instructor for a particular examination or assessment. Touching, holding, or accessing any unauthorized aid during the examination period constitutes a violation of the Student Code of Conduct, regardless of whether the aid is used.

Any item that may be considered an unauthorized aid must be kept out of view and in a closed container (e.g. zipped backpack, buttoned purse, etc.) during the entirety of the examination or assessment.

Unless specifically authorized in writing by the instructor, prohibited aids include, but are not limited to:

- Mobile phones and smartphones
- Smartwatches and fitness trackers with communication, recording, or internet capabilities
- Tablets, laptops, and other computing devices
- Earbuds, headphones, and other audio devices
- Smart glasses, cameras, recording devices, and wearable technology
- Artificial intelligence (AI) tools, chatbots, and other generative AI technologies
- Notes, textbooks, study guides, formula sheets, or reference materials
- Any other device, material, or resource not expressly permitted by the instructor

Students are responsible for clarifying any questions about permitted materials before the examination begins.