

### PHYS313 Course Information

**General**      PHYS313 is a one-semester course covering some important topics of modern astrophysics, including stellar structure, energy sources, spectra and evolution, as well as galaxies and the universe at large. The course is for students with some background in Physics who want to learn more about the applications of Physics to the phenomena observed in the universe.  
The course consists of 2 weekly lectures (including one midterm test), homework assignments, and a Final Exam.

**Prerequisite**      PHYS 232N; previous enrollment in PHYS323 – Modern Physics – strongly recommended

**Lectures**      Tuesdays and Thursdays, 1:30 p.m. – 2:45 pm, room 205 OCNPS

**WebSite**      <http://www.odu.edu/~skuhn/PHYS313/Home313.html>

**Required Text**      [Astrophysics in a Nutshell](#), 2<sup>nd</sup> edition, by Dan Maoz, Princeton University Press, 2016; ISBN: 9781400881178. (This site also has links to e-book versions and selected chapters online).  
The following books are recommended (buy/borrow/rent at least one or check them out in the library):

- *An Introduction to Modern Astrophysics*, by B.W. Carroll and D.A. Ostlie, Pearson/AW, 2007; ISBN-10: 0805304029 (this is the "big orange book" that covers "everything" and a lot more than we can cover in a 1-semester course)
- *An Invitation to Astrophysics*, by T. Padmanabhan, World Scientific, 2006; ISBN: 981-256-687-2 (paperback). Very mathematical and condensed, more of a reference than a text book.
- *The Cosmic Perspective: Stars, Galaxies & Cosmology*, by Bennett, Donahue, Schneider and Voit, Pearson-Addison Wesley; ISBN-10: 0-321-50618-9. This is a very basic introduction to the main topics for someone just beginning to study Astronomy.
- ...and my all time favorite: *Death from the Skies*, by Philip Plait, Penguin Books, 2009; ISBN 978-0-14-311604-2 (paperback). Touches on much of the material of this course under the unique angle: "How many different ways can the Universe kill us?"

**Faculty**      **Dr. Sebastian Kuhn**  
<http://www.odu.edu/~skuhn/>  
[skuhn@odu.edu](mailto:skuhn@odu.edu) - x5804, Room 2100J Physical Sciences Building 2  
Office Hours: TBA in 2100J or Tuesdays 11-12 Learning Ctr

**Synopsis** After an introductory class, we will spend about 3 weeks each on the following topics:

**Stellar Astrophysics**

Interaction of light and matter  
Stellar atmospheres and interior  
Stellar evolution

**Stellar End States**

Supernovae, white dwarfs and neutron stars  
General Relativity and black holes

**Nuclear Astrophysics**

Nucleosynthesis in stars and the big bang  
Neutrinos and cosmic rays

**Galaxies**

Types and evolution of galaxies  
Large-scale structure of the universe

**Cosmology**

Big Bang and inflation  
Cosmic microwave background  
Dark matter and dark energy

**Course Requirements** Class participation, homework (roughly once a week), one midterm test (in class) and a Final Exam (also in class; closed book and no notes). Attendance is not mandatory for all class meetings, but missing classes could lead to a reduction of the class participation part of the final grade.

**Grades** Your final grade will be based on homework (40%), Midterm (15%), class participation (15%) and Final Exam (30%).

**Honor Code** I consider it advantageous if students cooperate with each other on homework and studying. In fact, I encourage students very strongly to meet with each other for regular discussions and to tackle assignments together. However, all submissions for this course must be based on your own work - you have to cite all sources used and may not simply copy existing texts or other student's solutions.

Keep in mind the University policy: Any official sanction for cheating, including the assignment of a grade of F for a quiz or for a course as a penalty for cheating, will appear on the student's permanent academic transcript.

**Classroom Etiquette** Please follow the general rules of courtesy and respect. This means: Do **not** come late or leave early, and while in class, refrain from all other activities (including eating and drinking, talking to others, using electronic devices etc.). If you cannot concentrate fully on class work or cannot participate for the full duration, I prefer if you do not come to class (but there might be a participation grade penalty). I reserve the right to ask students to leave if they disrupt the learning experience of their classmates.

**Accommodation Statement** Students are encouraged to self-disclose disabilities that have been verified by the Office of Educational Accessibility by providing Accommodation Letters to their instructors early in the semester in order to start receiving accommodations. Accommodations will not be made until the Accommodation Letters are provided to instructors each semester.

---