

A study of the atmospheres, interiors, and evolution of stars. The contact between theory and observations is emphasized. Stellar atmospheres in hydrostatic and radiative equilibrium described. Models for the calculation of stellar spectra are discussed. Stellar winds are studied. Next, theoretical studies of stellar interiors and evolution, including equations of state, energy transport, and nuclear energy generation, are developed. Structures of main sequence, red giant, pre-main sequence, and white dwarves are studied and compared to observations. The evolution of single stars up to supernovae and the peculiar evolution of close binary systems are also studied. *0-3 credits.*

Instructor: Prof. Alan Calder  
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ESS 438

Meeting: Tuesday and Thursday 2:30 PM – 3:50 PM, P-125.

Office Hours: Calder: Mon. 10:30–12:00 AM, Wed. 2:30–4:00 PM, and by appointment.

Text: *Stellar Interiors* (2nd edition) by Hansen, Kawaler, and Trimble.

Evaluation: 30% Homework, 30% Midterm exam, 30% Final exam, and 10% project. Grades will be posted on Blackboard. The instructor will discuss grades during office hours but for privacy reasons will not report or discuss grades via email.

Homework: Homework will be assigned regularly and will be due the following week. Late homework will not be accepted without prior permission.

Exams: One midterm exam and one final exam. The final exam will be take-home and due at the exam period, Dec. 18 from 11:15 AM – 1:45 PM as scheduled by the Registrar. Missed exams may not be made up! With advance notice and/or careful documentation of extenuating circumstances, an exam may be excused or accommodations made.

**Academic Integrity:** Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another persons work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

**Critical Incident Management:** Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the University Police and the Office of University Community Standards any serious disruptive behavior that interrupts teaching, compromises the safety of the learning environment, and/or inhibits students ability to learn. See more here: <http://www.stonybrook.edu/sb/behavior.shtml>

**Electronic Communication:** Email to University email accounts is an important way of communicating for this course. For most students the email address is firstname.lastname@stonybrook.edu, and the account can be accessed here: <http://www.stonybrook.edu/mycloud>. \*It is your responsibility to read your email received at this account.\* For instructions about how to verify a University email address see this: <http://it.stonybrook.edu/help/kb/checking-or-changing-your-mail-forwarding-address-in-the-epo>. You can set up email forwarding using instructions here: <http://it.stonybrook.edu/help/kb/setting-up-mail-forwarding-in-google-mail>. If you choose to forward your University email to another account, the University is not responsible for any undeliver-

able messages.

**Religious Observances:** See the policy statement regarding religious holidays at <http://www.stonybrook.edu/registrar/forms/RelHolPol%20081612%20cr.pdf>. Students are expected to notify the course professors by email of their intention to take time out for religious observance. This should be done as soon as possible but definitely before the end of the add/drop period. At that time they can discuss with the instructor(s) how they will be able to make up the work covered.

**Disabilities:** If you have a physical, psychiatric/emotional, medical or learning disability that may impact on your ability to carry out assigned course work, you should contact the staff in the Disability Support Services office [DSS], 632-6748/9. DSS will review your concerns and determine, with you, what accommodations are necessary and appropriate. All information and documentation of disability is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the website <http://www.sunysb.edu/ehs/fire/disabilities.shtml>.

Note that the lecture topics are subject to some change depending on progress of the class and other factors. Exam dates will not change.

class #	month	day	chapter	topic
1	Aug.	27		Introduction/Overview
2	Aug.	29	1	Preliminaries
–	Sept.	2	–	no class Labor Day
3	Sept.	5	1	Preliminaries
4	Sept.	10	2	Stellar Evolution
5	Sept.	12	2	Stellar Evolution
6	Sept.	17	3	Equation of State
7	Sept.	19	3	Equation of State
8	Sept.	24	4	Radiative and Conductive Transfer
9	Sept.	26	4	Radiative and Conductive Transfer
10	Oct.	1	4	Radiative and Conductive Transfer
11	Oct.	3	5	Convection
12	Oct.	8	5	Convection
13	Oct.	10	6	Stellar Energy Sources
13	Oct.	15	6	Stellar Energy Sources
14	Oct.	17	–	Midterm Exam
16	Oct.	22	7	Stellar Models
17	Oct.	24	7	Stellar Models
18	Oct.	29	7	Stellar Models
19	Nov.	31	9	Structure and Evolution of the Sun
20	Nov.	5	9	Structure and Evolution of the Sun
21	Nov.	7	10	Structure and Evolution of White Dwarfs
22	Nov.	12	2	Mini-workshop on neutron star mergers
23	Nov.	14	2	Stellar Explosions
24	Nov.	19	2	Stellar Explosions
25	Nov.	21	2	Brown Dwarfs, YSOs
26	Nov.	26	2	Discussion/Presentations
–	Nov.	28	–	Thanksgiving
27	Dec.	3	–	Discussion/Presentations
28	Dec.	5	–	Discussion/Presentations
Final	Dec.	17 <sup>a</sup>	All	<b>Final Exam due end of period 11:15 – 1:45 PM</b>

<sup>a</sup>Nota Bene: The ultimate authority on the date and time of the final is the Registrar. Students should monitor the exam schedule on the Registrar's web page (<http://www.stonybrook.edu/registrar/finals.shtml>) during the semester as changes have happened in past semesters. Please also note the student responsibility statement on the Registrar's exam schedule page.