Ay123: Structure and Evolution of Stars
Fall 2018 Syllabus

Time: 9:00am-10:30am, Mondays and Wednesdays
Room: Cahill 219
Instructor: Jim Fuller
Units: 9 (3-0-6)
Student Level: graduate students and seniors
Website: http://www.tapir.caltech.edu/~fuller/Ay123
Textbooks:

- *Stellar Interiors - Physical Principles, Structure, and Evolution* by Hansen, Kawaler, & Trimble
- *Stellar Structure and Evolution* by Kippenhahn, Weigert, & Weiss
  Ebook can be found here:
  https://clsproxy.library.caltech.edu/login?url=http://dx.doi.org/10.1007/978-3-642-30304-3
- *(optional) Principles of Stellar Evolution and Nucleosynthesis* by Clayton

Topics:

- Thermodynamics, equation of state, convection, opacity, radiative transfer, stellar atmospheres, nuclear reactions, and stellar models.
- Evolution of low- and high-mass stars, supernovae, and binary stars.

Grading:

- Five problem sets, each worth 10% of final grade
- Oral midterm, worth 20% of final grade
- Written, take-home final exam, worth 30% of final grade

Homework Policy:
Please attempt to solve the problems on your own before consulting other students. You may consult books and published papers but not old homework solutions from this or any other class. After that, discussion of the problems with other students in this class to improve your understanding of the underlying physics is permitted and encouraged. However, you may not copy homework solutions.

The formal Ay123 policy is that students can freely discuss the problems, but they need to work out solutions on their own without referring to others' solutions.

Class Schedule:
Reading assignments are indicated by HKT (Hansen, Kawaler, & Trimble) and KWW (Kippenhahn, Weigert, & Weiss).

Mon Oct 1:	I. Physical properties of stars
Wed Oct 3:	II. Equilibrium and timescales *read HKT chs. 1-2 and KWW chs. 1-4*
Mon Oct 8:	II. continued
Wed Oct 10:	III. Equations of stellar structure; **Problem set 1 due** *read HKT chs. 4-5 and KWW chs. 5, 7, 17, 19*
Mon Oct 15:	III. continued

Wed Oct 17:	IV. Energy generation and opacity
Mon Oct 22:	V. Homology and the main sequence
Wed Oct 24:	VI. Equations of state; **Problem set 2 due** *read HKT ch. 3 and KWW chs. 13-16*
Mon Oct 29:	VI. continued
Oct 31-Nov 2:	**Oral midterms**
Wed Oct 31:	No class (midterms)
Mon Nov 5:	VII. Helioseismology; *read HKT ch. 8 and KWW chs. 29, 31*
Wed Nov 7:	VIII. Pulsating stars; **Problem set 3 due**
Mon Nov 12:	IX. Nuclear reactions *read HKT ch. 6 and KWW ch. 18*
Wed Nov 14:	X. Abundances of elements
Mon Nov 19:	XI. Supernovae and compact remnants *read HKT ch. 9 and KWW chs. 34-36*
Wed Nov 21:	XI. Continued, **Problem set 4 due**
Mon Nov 26:	XII. Binary Stars;
Wed Nov 28:	XIII. Stellar evolution *read HKT ch. 7 and KWW chs. 10-12, 28 (and optionally Clayton ch. 7)*
Mon Dec 3:	XIV. Stellar atmospheres *read KWW chs. 30-33*
Wed Dec 5:	XIV. continued
Fri Dec 7:	**Problem set 5 due**
Dec 10-14:	No class (study period)
Fri Dec 14:	**Final exam due by 5pm**