Stars: Stellar Structure and Evolution
A1120

Class Meets:
Tu, Th  11:00 am - 12:15 pm
Thaw 210

Instructor:
Prof. D. John Hillier
318 Allen Hall
412-624-9213
hillier@pitt.edu

When emailing me, you MUST include A1120 in the subject matter of the email:
e.g., Query regarding Q1, HW 1 (A1120).
Do NOT email asking trivial questions that can be answered using a few
minutes of your time.

Office Hours
Monday 11:00 – 12:00
By appointment --- EMAIL me providing several alternate dates & times.
Any time I’m in my office and free.

Course Description:
Observational properties — distances, luminosities, temperatures; Binary stars
— orbits, stellar masses; Stellar atmospheres — radiative transfer, spectra
formation, spectral lines; Stellar structure — hydrostatic and thermal
equilibrium, energy generation, opacities, nucleosynthesis; Stellar evolution
— formation and death of stars, protostars, main-sequence, red giants,
planetary nebulae, supernovae; Stellar remnants — white dwarfs, neutron
stars, and black holes.

Lectures:
27 lectures (+ 1 mid term exam + 1 exam during finals week)
Stars: Stellar Structure and Evolution

Text Book:
An Introduction to Modern Astrophysics (2nd edition)
Bradley W. Carroll & Dale A. Ostlie
Addison-Wesley Publishing Company
ISBN 0-8053-0402-9

Course Outline:
<table>
<thead>
<tr>
<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>The Continuous Spectrum of Light:</td>
<td>Ch. 3</td>
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<tr>
<td>The Interaction of Light and Matter:</td>
<td>Ch. 5</td>
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<tr>
<td>Binary Stars and Stellar Parameters:</td>
<td>Ch. 7 (&amp; 2)</td>
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<tr>
<td>The Classification of Stellar Spectra:</td>
<td>Ch. 8</td>
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<td>Stellar Atmospheres:</td>
<td>Ch. 9</td>
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<td>The Interior of Stars:</td>
<td>Ch. 10</td>
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<td>The Sun:</td>
<td>Ch. 11</td>
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<td>Interstellar Medium &amp; Star Formation:</td>
<td>Ch. 12</td>
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<tr>
<td>Main-Sequence &amp; Post-Main Sequence Evolution:</td>
<td>Ch. 13</td>
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<td>(Stellar Pulsation:</td>
<td>Ch. 14</td>
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<td>The Fate of the Most Massive Stars</td>
<td>Ch. 15</td>
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<td>The Degenerate Remnants of Stars:</td>
<td>Ch. 16</td>
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<tr>
<td>GR &amp; Black Holes:</td>
<td>Ch. 17</td>
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<tr>
<td>(Close Binary Systems:</td>
<td>Ch. 18</td>
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Other Texts

Introduction to Stellar Astrophysics
E. Böhm-Vitense
Cambridge University Press
Basic Stellar Observations and Data (Vol. 1)
Stellar Atmospheres (Vol. 2)
Stellar Structure and Evolution (Vol. 3)

An Introduction to the Theory of Stellar Structure and Evolution
D. Prialnik,
2000, Cambridge University Press,

The Physics of Stars (2nd ed.)
A. C Phillips
Wiley (2008)

CourseWeb

Use of CourseWeb (Blackboard) will be made during the term.
You should familiarize yourself with CourseWeb immediately.
Assignments will posted on CourseWeb on a regular basis.
Announcements regarding reading exercises etc will also be placed on CourseWeb.
During the term you will receive EMAIL at your PITT account. If you don’t receive an EMAIL from me by the second lecture, you need to see me.
Please ensure that your MAIL box is not full.

Important Dates

Friday 6th Sept. – End Fall-term add/drop
Monday 14th Oct. – Fall break
Tuesday 15th Oct. – Monday classes
27 Nov. to 1 Dec. – Thanksgiving
Friday 6th Dec. -- Last day of classes
Stars: Stellar Structure and Evolution

Exams

Mid Term: Thursday, October 17
Final: Saturday, 14 December: 8:00 — 9:50 am

Grades

Based on exams, homework and class participation

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mid Term</td>
<td>25%</td>
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<tr>
<td>Final exam</td>
<td>45%</td>
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<tr>
<td>Homework &amp; project</td>
<td>25%</td>
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<tr>
<td>Class participation</td>
<td>5%</td>
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The instructor reserves the right to adjust this distribution slightly.

Homework / Project

The homework will consist of both problem sets and essay style questions. The homework is an important part of the grade and must be taken seriously. Late homework will NOT be accepted without my prior approval.

You may discuss homework with each other, but the presentation and working on the homework must be your own. Where there is evidence of copying (e.g., same simple numerical error) both homework will receive zero. Repeated offenses will result in an F for the course, and a note will be sent to the Dean.

Homework:

- Solutions must NOT be written on the homework sheet, and separate pages MUST be stapled.
- In general, it is useful to write a clear statement of the problem before commencing its solution.
- Answers must be neat and readable. Often this will mean that you need to rewrite your solution. Scrawl will not be graded.
- All working needed to get to the final result must be shown. However I do not need to see invalid working.
- All units must be clearly shown.
- Marks will be deducted if you give an absurd answer and don’t comment. If you obtain an absurd answer you must include a comment (especially in an Exam), and come and see me.