PHYS 6980/8980 — Spring 2006

Syllabus — Draft 3

Time: MWF 12:00–12:50
Room: MH 4012
Instructor: Dr. N. D. Morrison
Office: Ritter Observatory 205, 530-2659
E-mail: ndm@astro.utoledo.edu
Office hours: MTWR 3–4 PM

Web page: http://astro1.panet.utoledo.edu/~ndm/6980.html and also see the course pages in MyUT

Prerequisite: ASTR 4810/PHYS 5810, or equivalent preparation

Required Texts


Requirements

• Awareness of any changes to this syllabus that may be announced
• Homework assignments will be due occasionally, as announced.
• Term project
  Oral presentation (20 minutes) and written report
  Review of properties of a type of peculiar star
  Analysis of Ritter spectra with IRAF and with synthetic spectra
• Final examination, 12:30–2:30 Monday, May 1, 2006. Questions will be mainly descriptive
  and based on the learning objectives below. More detailed statements of these objectives
  will be provided later.

Learning objectives for course

Know the defining features of the spectra of each of the types of normal star
Understand the physical basis of how the defining features vary with spectral type
Understand the physics of the special character of each spectral type
Understand how stellar temperatures, gravities, and abundances are determined
Understand the main reasons why some stars have emission lines

Learning objectives for project

Master skills of basic spectrum analysis with IRAF
Be able to download and use synthetic spectra for comparison
Know the defining features of the type of peculiar star studied
Have physical understanding of the type of star studied
Gain experience with writing a technical report

Weights to be used in computing final grade

Homework: 10%
Project: 50%
Final exam: 40%
Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Books, Chapter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 16</td>
<td>Classification of normal stars</td>
<td>Jaschek 2, 3</td>
</tr>
<tr>
<td>Jan. 23</td>
<td>Spectral lines</td>
<td>Jaschek 2; Emerson 3</td>
</tr>
<tr>
<td>Jan. 30</td>
<td>Energy distributions</td>
<td>Emerson 5</td>
</tr>
<tr>
<td>Feb. 6</td>
<td>Physical basis; A stars as example</td>
<td>Jaschek 10, Emerson 5</td>
</tr>
<tr>
<td>Feb. 13</td>
<td>B: spectrum of He I</td>
<td>Jaschek 9, Emerson 5</td>
</tr>
<tr>
<td>Feb. 20</td>
<td>O: UV, winds, non-LTE, emission lines</td>
<td>Jaschek 8, Emerson 10</td>
</tr>
<tr>
<td>Feb. 27</td>
<td>F: Li</td>
<td>Jaschek 11</td>
</tr>
<tr>
<td>Mar. 6</td>
<td>[No classes — spring break]</td>
<td>—</td>
</tr>
<tr>
<td>Mar. 13</td>
<td>G: chromospheres, coronae</td>
<td>Jaschek 12, Emerson 4, 11</td>
</tr>
<tr>
<td>Mar. 20</td>
<td>K: Wilson-Bappu; M: molecules</td>
<td>Jaschek 13, 14; Emerson 5, 9</td>
</tr>
<tr>
<td>Mar. 27</td>
<td><strong>T Tauri stars</strong></td>
<td>Jaschek 12</td>
</tr>
<tr>
<td>Apr. 3</td>
<td>Student presentations</td>
<td>—</td>
</tr>
<tr>
<td>Apr. 10</td>
<td>Student presentations</td>
<td>—</td>
</tr>
<tr>
<td>Apr. 17</td>
<td>L, T</td>
<td>[Source materials TBD]</td>
</tr>
<tr>
<td>Apr. 24</td>
<td>White dwarfs</td>
<td>Jaschek 15</td>
</tr>
</tbody>
</table>

Available Topics for Term Projects: Peculiar Stars

The paper resulting from this project should have the format and flavor of a research report. The introduction should review the published literature on the type of star, including at least one primary, refereed research paper. Then it should describe your own analysis of archival data (preferably Ritter spectra) on one or more examples of the type. As many spectra as needed to make the main points should be studied.

You may not choose a type that is the subject of your own thesis research or of a presentation you have given in another graduate course, including Bag Lunch. The list below is a minor revision of that in Draft 1.

Before making a definite choice of one of the asterisked topics below, check to make sure the Ritter Archives have enough spectra of sufficient quality for a project.

1. Wolf-Rayet
2. Classical Be
3. S Dor/LBV
4. Herbig Ae/Be
5. Ap (α² CVn)*
6. β Cep
7. δ Cep*
8. RS CVn
9. Carbon*
10. R CrB*
11. RV Tau*
12. Mira*
13. Symbiotic

Deadlines

- Choice of topic; definition of computer resources to be used: Wed., Feb. 1
- Outline—listing of data set to be used, major scientific issues to be covered, major references: Wed., Feb. 15
- Draft of term paper: Fri. Mar. 24