Class meets:  
   M, W  1:15 to  2:30 pm

Instructor:  
   Dr. D. John Hillier  
   318 Allen Hall  
   Phone 624-9213 (Department: 624-9000)  
   Email  hillier@pitt.edu

Office Hours:  
   F  1:15-2:30  
   Any time I’m available (not before a class)  
   By appointment

Grades:  
   Final Assignment:  Due: Fri, 34-Dec  
   Homework:  20% 80%

I reserve the right to adjust the grade allocations slightly.
**Other important dates (2020)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>19(^{th}) Aug</td>
<td><strong>Classes begin (Wednesday)</strong></td>
</tr>
<tr>
<td>4(^{th}) Sep</td>
<td><strong>End add/drop period (Friday)</strong></td>
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<tr>
<td>7(^{th}) Sep</td>
<td><strong>Labor day – classes as usual (Monday)</strong></td>
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<tr>
<td>14(^{th}) Oct</td>
<td><strong>Self care day (no classes – Wednesday)</strong></td>
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<tr>
<td>25(^{th}) – 29(^{th}) Oct</td>
<td><strong>Self care day (no classes – Wed-Sun)</strong></td>
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<tr>
<td>4(^{th}) Dec</td>
<td><strong>End of fall term (Friday)</strong></td>
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</tbody>
</table>
General references:

The Fundamentals of Stellar Astrophysics,
Collins II (1989)
http://bifrost.cwru.edu/personal/collins/astrobook/

Introduction to Stellar Astrophysics (Vols 1, II, III)
E. Bohm-Vietense

Modern Astrophysics,
B.W. Carroll, D.A. Ostlie, (Addison-Weseley)

Astrophysics of Gaseous Nebulae and Active Galactic Nuclei,
Osterbrock (1984, University Science Books)

Astrophysics of Gaseous Nebulae and Active Galactic Nuclei,
Osterbrock & Ferland (2006, University Science Books)

Atomic Astrophysics and Spectroscopy
Pradhan and Nahar (2011, Cambridge University Press)

Advanced Stellar Astrophysics
Rose (Cambridge)
Stellar Atmospheres

Stellar Atmospheres,
Theory of Stellar Atmospheres
The Observations and Analysis of Stellar Photospheres,
Interpreting Astronomical Spectra,
    Emerson (1996, Wiley and sons)
Radiative Transfer and Spectral Line formation in Stellar Atmospheres
    Rutten (Rutten radiative transfer notes)
Stellar Interiors

Principals of Stellar Evolution and Nucleosynthesis,
Clayton (1983)
Stellar Interiors: Physical principles, Structure, and Evolution
C.J. Hansen, S.D. Kawaler (1994, Springer-Verlag)
Stellar Structure and Evolution
Kippenhann, Weigert (1990, Springer-Verlag)
An Introduction to the Theory of Stellar Structure and Evolution
Diana Prialnik (2000, University Press).
Understanding stellar evolution
Henny J.G.L.M. Lamers and Emily M. Levesque (IOP, 2017)

Advanced undergraduate level

The Stars: Their Structure and Evolution
The Physics of Stars
Stellar Evolution and Nucleosynthesis
Course Outline

1. Fundamentals of Stellar Astronomy (Class & assigned reading)
   - Observables, Stellar Classification
   - Magnitudes, Photometric systems
   - Interstellar Extinction
   - Measurement of stellar parameters:
     - Distances, masses, radii
   - H-R diagram
   - Atomic spectra

2. Stellar Atmospheres
   - Equation of Radiative Transfer
   - Diffusion, Grey Atmosphere
   - Convection
   - Radiative and Atomic processes
   - Local Thermodynamic Equilibrium (LTE)
   - LTE line formation
   - Non-LTE
   - Statistical equilibrium equations
3. Interstellar medium and H II regions
   - Thermal equilibrium
   - Cooling function
   - Structure of ISM
   - Interstellar shocks
   - Dust

4. Stellar Interiors
   - Equation of state
   - Polytropes (briefly)
   - Hydrostatic and thermodynamic equilibrium
   - Energy transport
   - Energy generation and nucleosynthesis
   - Stellar Evolution

Note: The concepts of non-LTE, the statistical equilibrium equations, and atomic and radiative processes are relevant for both stellar atmospheres and the ISM/HII regions.