NAU NORTHERN ARIZONA UNIVERSITY

Department of Astronomy and Planetary Science

AST530, Section 1, Topics in Astronomy: Stellar Astrophysics
Fall, 2019

Total Units of Course Credit: 3.

Course Pre-requisite: Bachelor's Degree in Physics or Astronomy.

Mode of Instruction: In class lectures, Tuesdays and Thursdays, 12:45-2:00pm in 019-111.

Instructor: Philip Massey, Phil.Massey@nau.edu, phone 233-3264 (Lowell)

Office Hours: Talk to me after class, or make appointment. Email responses will be prompt, unless I'm on travel.

Course Description: The class will cover advanced topics pertinent to research in stellar astrophysics. These will include the determination of fundamental physical parameters of stars using stellar atmospheres and evolution models. Students are expected to have previously taken an undergraduate stellar astrophysics course.

Course Student Learning Outcomes: Students will have a good understanding of stellar evolution and how fundamental stellar properties are determined and modeled.

Assessments of Course Student Learning Outcomes: Weekly homework assignments, midterm exam, and individual projects.

Grading System: Homework assignments: 40%, Midterm 30%, Final Project: 30%. There will be no final exam.

Readings and Materials: Text will be Lamers' and Levesque's *Understanding Stellar Evolution* (IOP).

Class Policies: Students are expected to turn in their assignments when they're due; late assignments will be accepted if prior arrangements are made with the instructor.

University Policies: *https://nau.edu/Curriculum-and-Assessment/_Forms/Curricular-Policy/Syllabus_Policy_Statements(2)/*

Final Project: The final project will be due November 21. Examples of potential projects are the following:

1) Adopting a Salpeter initial mass function (IMF), and assuming continuous star formation, use the Geneva and/or MESA evolutionary models to determine the "blue-to-red supergiant ratio" (B/R) as a function of metallicity.
2) Adopting a Salpter IMF and a single burst of star formation of duration tau, determine the evolution of the B/R ratio as a function of time. Demonstrate how much this depends upon tau.

3) Using the MESA models, and assuming a Salpeter IMF and continuous star formation, compute the expected relative fraction of red supergiants and AGB stars as a function of bolometric luminosity.

Class Outline:

Given that this is the first time the course is being taught we will be flexible in the outline of the class schedule. The schedule will be kept updated and kept as a google doc at:

https://docs.google.com/document/d/1WW2dimcRXRApXJbxEYbkIPnAxWPflhEXH_GB771lVE8/edit?usp=sharing