

GUIDELINES FOR ASTR 3970

Independent Study in Variable Stars

Credit Hours: 2

Prerequisites: Astronomy I (Astr-1010) and Astronomy II (Astr-1020) with a grade of B- or better, or permission of instructor.

Room: Harry D. Powell Observatory

Instructor: Dr. Gary Henson Email: hensong@etsu.edu

Office: Brown Hall Room 272 Phone: (423)-439-6906

COURSE DESCRIPTION: An independent study, self-paced hands-on laboratory course on variable stars.

SPECIFIC COURSE RULES AND REQUIREMENTS:

- There will be no lectures in this course. This is solely a self-paced laboratory.
- Students must complete online homework and stellar observations throughout the semester.
- Students will make approximately weekly observations of variable stars using the 14-inch Celestron Telescope at the Harry D. Powell Observatory (students must be supervised until trained). At least ~~seven~~^{nine} observations must be made over the course of the semester, spread out over a baseline of at least five weeks (preferably longer).
- Students are responsible for the proper set-up and shutdown of the telescope.
- The telescope will be available for use normally every clear night, except for the nights when the telescope is scheduled for use in labs or with the public. See the instructor at the beginning of the semester for orientation.
- From the observations, the absolute visual magnitudes of each star must be extracted, as well as uncertainties on the measurements.
- The final data set must be submitted to the web site of the American Association of Variable Star Observers (AAVSO).
- A final written report is required at the end of the semester. This report is due BEFORE finals week begins.
- Course grade is based on homework, number and quality of observations, and the final report.

HOMWORK INFORMATION FOR VARIABLE STAR COURSE

There will be six homework assignments due throughout the semester. These will be done using the on-line CAPA homework software, at <http://capa.etsu.edu/>. For directions on how to use the software, go to http://www.etsu.edu/physics/bSmith/variable/capa_directions.html. User names and passwords will be emailed to students at the beginning of the semester.

The due dates for these assignments are posted below. The assignments can be done ANY time before the due date (they can all be done during the first week of classes, if the student desires), but they **MUST** be done before the posted due date. After that time, access to the assignment will be prohibited by CAPA. **It is advised that the homework be done as soon as possible.** The first three assignments must be done **before the student is allowed to use the telescope on their own.**

^{Five} It is advised that, before trying the homework, the student print out the assignment and review it. You are only allowed ~~THREE~~ **THREE TRIES** at each problem, so review the material well **before** starting the homework set, and be sure that you have the correct answer before entering it. Most of the first and second assignments will be review of material covered in Astronomy I and II (the night sky, celestial coordinates, magnitudes, and basic information on telescopes). Most of this material will be in the astronomy textbook and lab manuals used for Astronomy I and Astronomy II. Some additional required material on coordinate systems is available on-line at the University of Colorado at <http://lyra.colorado.edu/sbo/astroinfo/coords/coordinates.html>. In addition, the Kitt Peak Observer's Calendars at <http://www.noao.edu/kpno/skycal/skycal.html> and the SIMBAD database at <http://simbad.u-strasbg.fr/Simbad> will also be needed. * Try Google if links are dead

The third assignment covers the basic equipment and setup of the 14" telescope at the ETSU observatory. **This homework assignment must be done before the student is allowed to use the telescope on his/her own.** A detailed manual describing how to set up and use the telescope will be provided at the beginning of the semester. After the students have studied these, there will be a telescope orientation session for the class at the telescope, where the instructor will review this material. The student should then study this material and then complete the homework set, **before using the telescope on their own.**

The fourth assignment covers CCDs and photometry. At the beginning of the semester, the instructor will hand out a copy of a manuscript on photometry using CCDs, written by W. Romanishin at the University of Oklahoma. To prepare for this homework assignment, review this manuscript. There are also numerous websites on CCD's you may use for reference. In particular, the CCD university site at <http://www.ccd.com/ccdu.html> has lots of detailed information.

The fifth assignment will cover stellar evolution. Most of this material will be review of material covered in Astronomy II. This material will be in the textbook used for Astronomy II.

The last assignment will cover more detailed information on variable stars. Additional material on variable stars (from the American Association of Variable Star Observers) can be found on their website: <http://www.aavso.org/vstar/> and links from that site. This material should be studied before attempting this homework set.

The homework assignments and due dates are:

1. The Night Sky, magnitudes, and Coordinate Systems: Friday of the second week of classes.
2. Light and Telescopes: Friday of the third week of classes.
3. The ETSU Telescope: Friday of the third week of classes.
4. CCDs and Photometry: Friday of the fourth week of classes.
5. Stellar Evolution: Friday of the sixth week of classes.
6. Variable Stars: Friday of the eighth week of classes.