

AST 341 – Observational Techniques II

Class Meetings: McConnell Hall 406, Smith College, Tues. 7-10 pm

Course Description: The course begins with an observing run at Kitt Peak National Observatory near Tucson, AZ the week before the 2015 spring term starts. The class will use the WIYN 0.9-meter telescope and Half Degree Imager CCD Camera to image starburst galaxies with the goal of relating star formation activity to the stellar and gas content of the galaxies. Each student will get his/her own data and reduce and analyze it during weekly seminars through the semester. Scientific results will be presented in a poster session to the full Five College Astronomy Department at the end of the semester and may result in co-authorship on a published paper.

Readings:

WIYN 0.9-m telescope and HDI user manuals

Giant Telescopes by W. Patrick McCray

Scientific papers relevant to selected research projects (TBD)

Class:

Class time will be split between a short lecture, class discussions, and group work. During discussions, each group will update the class on their progress, ongoing issues, and latest findings.

Grade Evaluation:

- *Research Proposal* (30%) – Each team will plan a research project to be completed over the semester using the data obtained at the WIYN 0.9-m telescope. Each student will submit his/her own written proposal justifying and explaining the research plan.
- *Class Discussions* (35%) – Students will give an informal update to the class each week on their research progress, difficulties or unresolved questions, and latest findings. These updates may include brief presentations to the class or summaries of scientific papers. Students will also ask questions, provide feedback, or offer suggestions regarding other groups' updates. Grades will be based on participation and the clarity and substance of the presentations.
- *Final Project* (30%) – Each team will create a poster containing background scientific information, an explanation of the data and the analysis techniques, and a summary of their conclusions. The

evaluation will be based on both the quality of the research and of the poster.

- *Quizzes* (5%) – There will be periodic quizzes on assigned readings or material discussed in class.

Schedule of lecture topics and due dates:

Jan. 13-21 – Trip to Kitt Peak, AZ. Visit to Saguaro National Park, tour of KPNO, and observing run.

Lecture topics: the founding of KPNO, the Tohono O’odham Nation (guest lecture by Katy Garmany, NOAO)

Reading discussion of *Giant Telescopes*.

Jan. 27 – Intro to research projects; Background info on the observed starbursts; How to write an observing proposal

Feb. 3 – **Outline of proposals due.** Review of data reduction; Emission-line imaging; aperture photometry

Feb. 10 – **Drafts of proposals due.** Spectroscopy (Part I)

Feb. 17 – **Finish data reductions.** Spectroscopy (Part II).

Feb. 24 – Statistical methods

Mar. 3 – **Revised proposals due.** SED Fitting

Mar. 10 – Measuring morphologies

Mar. 17 – **Spring Break – No Class**

Mar. 24 – Archival data and surveys

Mar. 31 – Sample selection

Apr. 7 – Spatial correlations and distributions

Apr. 14 – **Outline of posters due.** Starburst galaxies and galaxy evolution

Apr. 21 – **Draft of posters due.** Future observational capabilities

Apr. 28 – **Posters due.** Final updates to class; discuss future observations

TBD – **Presentation to Five College Astronomy Department at UMass**