

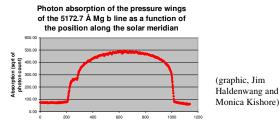
The CUREA Program at Mount Wilson

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16-inch scope and guru (photo, Joan Chamberlin)

Abstract

For fifteen years, Mount Wilson Observatory has been host to a unique educational program designed to introduce undergraduate students of physics and astronomy to elements of observational solar and stellar astrophysics. Founded by faculty members from four-year colleges who dubbed themselves the Consortium for Undergraduate Research and Education in Astronomy (CUREA), the CUREA program is an intensive two-week course in observational astronomy. It includes lectures by astronomers and physicists, observational exercises in both solar and stellar astrophysics, tours of various research facilities on the mountain and in the Los Angeles area, and an observational mini-project designed and executed by each student during the second week of the program. This paper will present the program's curriculum and goals, a brief history, and examples of observational projects undertaken by recent participants. CUREA is administered by the Mount Wilson Institute.



Facilities:

Snow Solar Telescope and Spectrograph

16-inch Meade LX-200 w/SBIG CCD and spectrograph

Mount Wilson Library, Galley, Monastery

60-inch telescope (currently equipped only for visual observing)





Snow Telescope coelostat mirrors (photo, Carmelita Miranda)

Curriculum:

Week 1

Morning: lectures and activities on **solar physics**, including practical training in setting up the Snow telescope's coelostat mirrors, identifying lines in the solar spectrum, and acquiring digital images of sections of the spectrum.

Afternoon: lectures and practice exercises on telescopic observing, CCD image reduction, three-color imaging, photometry, and spectroscopy.

Evening: hands-on practice in operating the Meade telescope, camera, and spectrograph, **acquiring images for processing** during the next day's classroom session.

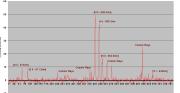
Week 2

Students work individually or in pairs on an **observing project** of their choice. Results are presented in a group meeting on the last day of the program.

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above, line IDs for a portion of it at right.

(graphics, Michelle Hartwell)



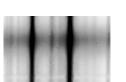
Students: ~ 8 per year; generally undergrads with one to three years of physics coursework completed; many international students; some receive either full or half scholarship support.

Extras:

Tours of research projects and telescopes at Mt. Wilson: solar and stellar telescopes (including 100-inch Hooker Telescope), CHARA and ISI interferometers, adaptive optics and helioseismology programs.

Guest speakers on Mount Wilson history – Hale's telescopes, DC power generator, establishment of the observatory by the Carnegie Institute.

Excursions off the mountain to visit astronomical sites of interest such as Palomar Observatory, JPL, Caltech, the Hale Lab, and/or Griffiths Observatory.





Broadening of Sodium-D lines in a sunspot, due to Zeeman splitting

Star trails and clouds (boo!) over 150-ft tower (photo, John Davey)

(image, Andrew Vandenburg and Anke Hackmann)

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Recent mini-project topics:

Solar limb darkening

Zeeman effect in Na-D lines

Extinction correction

Limiting magnitude vs. azimuth

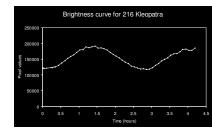
5 minute solar oscillations

Stellar radial velocities

Asteroid rotation curve

Cluster color-magnitude diagrams

Emission lines from planetary nebulae



Light curve, used to derive asteroid rotation rate (graphic, Christopher Ashford)

Acknowledgements:

CUREA founders Walter Mitchell, Joseph Snider, and Sandy Yorka;

CUREA supporters Larry Webster, Don Nicholson, Dave Jurasevich, Tom Meneghini, Darrell Moon, Bob Eklund, and many others;

recent CUREA staff members John Hoot, Karina Leppik, Shelley Bonus, Matthew Wenger, and especially Michael Faison, who helped develop the night-time curriculum described herein.