STEM Education at the Institute for Astronomy
UH Manoa

G. Mathews & R. Gal
(for G. Hasinger)
SEARCh Symposium 9/19/14
Overview

Graduate

- Ph.D. program
- ISEE Professional Development Program

Undergraduate

- BA & BS
- REU
- ASTR for non-majors
- Akamai Workforce Initiative

9-12

- HI-STAR
- ALI’I teacher training
- Science in Action: Astronomy

Outreach
Astronomy pipeline

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Outreach
## STEM professionals

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### Outreach
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**Note:**
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Community

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Outreach
Highlights

HI-STAR
ALI’I teacher training
Science in Action: Astronomy

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Akamai Workforce Initiative

Ph.D. program
ISEE Professional Development Program

Undergraduate

Graduate

Outreach
Middle school and high school students doing real research.

- Students use professional telescopes (LCOGT etc.) and receive year long mentoring.
- For 2014:
  - First place Hawai‘i Science and Engineering Fair
  - First place for Earth/Space Science Utah State Science and Engineering Fair
  - 6 First place at county level
  - Students won numerous awards, including $80K scholarship.

Mary Kadooka, JD Armstrong, IfA
BS Astrophysics & BA Astronomy

Preparation for research or Astronomy-related careers

• BA: students intending careers in observatory support, planetariums, teaching, science journalism, or other STEM fields
• BS: students intending careers in astronomy or physics research
• Unique access to observing resources (e.g., Mauna Kea, Haleakula, LCOGT), and courses taught by world class research faculty
• Anticipate ~20 - 30 students / year
• Awaiting Board of Regents approval

Pan-STARRS, Haleakala

Dave Sanders, Josh Barnes, Geoff Mathews, Mike Nassir
Ph.D. Astronomy

World-class astronomy graduate program

- 35 students
- Consistently high-achieving (e.g., Zahid ARCS award 2013, Bowler Trumpler Award 2014)
- 83% remain in Astronomy
- Access to Mauna Kea & Haleakela observatories
- High participation in EPO

Dave Sanders
Outreach

200 yearly events with 25,000 contacts

- Yearly open house in Manoa with ~1500 visitors
- Partner with observatories for Hilo Astroday (~5000 visitors), Journey Through the Universe, and other events
- Public talks at UHM by both IfA faculty and visiting luminaries
- Participation in Outreach College’s statewide library talks series
- Special events, e.g. Venus transit viewing in Waikiki with 15,000 visitors
- Collaboration with Super M and Ka’Pilina
- Star parties at schools, parks, and libraries
- School visits, including portable planetarium
- Boy Scouts astronomy merit badge program
Funding

- Outreach: mostly Friends of the IfA (donations, coordinate with UHF)
- HI-STAR & ALI’I: mostly UH NASA Astrobiology Institute
- Science in Action, talks at state libraries: Outreach college
- Some outreach programs: EPO sections of individual grants
- Undergraduate and graduate programs: g-funds for instructors and TA positions, individual grants fund RA positions
- Akamai Workforce Initiative: IfA Maui
- Fees for ISEE Professional Development Program: individual grants, Director
Opportunities

- Research into effectiveness of outreach practices
- Develop teaching resources for science teachers in the community (i.e. kits)
- Extend outreach efforts to include new undergraduate majors
- School of Astronomy: Astro-X options for BA and BS majors
- Need to secure long-term funding for HI-STAR, ALI’I, Akamai, PDP
- Ties with Thirty-Meter Telescope to support undergraduate students and outreach?
- Stronger ties with College of Education? Astronomy as a great field of study for high school science teachers
Extras
Other programs

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  - 9-12
  - ALI’I teacher training
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ALI’I

Cross-disciplinary science training for grade-school teachers through the lens of Astrobiology.

- 1 week summer workshop
- Staffed by NASA Astrobiology Institute personnel, graduate students, guest lecturers
- 10 - 20 science teachers per year

Mary Kadooka, IfA
Introduction to astronomy research skills and resources for middle school and high school students

- 2 week, 3 hour summer class for 10 grade 9-12 students
- Students carry out analysis of curated data and present findings in class

### Tracking the Asteroids

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Geoff Mathews
REU programming

Summer-time Astronomy research for undergraduates from throughout the US

- In process of re-tooling
- Consistently hosted ~10 undergraduate students from around the US in summer research program, mentored by faculty and post-docs
- Included skills seminar planned by post-docs and grad students
Akamai Workforce Initiative

Summer internships for engineering and science undergraduate students in Hawaii

- 1 week crash course, plus weekly seminar
- Teaching by IfA graduate students via ISEE PDP program
- Includes training for mentors at science and engineering workplaces
- 84% retention in STEM

Lisa Hunter
Astronomy for non-majors

Engagement with Astronomy and introduction to scientific thinking

- ASTR 110 and accompanying lab, survey of Astronomy, ~400 - 600 students per year
- Several courses (History of Astronomy, Archaeoastronomy, Astrobiology, Evolution of the Universe, Cosmos & Culture) that give a more focused view, typically 10-30 students per offering

Dave Sanders, Geoff Mathews
Training in inquiry-based teaching for graduate students, post-docs, and faculty

- Organized by UC Santa Cruz Institute for Science & Engineering Educators
- High participation by IfA graduate students & postdocs (~10 per year), with IfA funding for travel and fees
- 5 day and 3 day workshops, teams design full inquiry based lesson to carry out in another context (e.g., Akamai Workforce Initiative, ASTR 110 Lab) serving a total of ~50 students

Lisa Hunter