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Latham Science Communication Project

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Science Outreach Collaboration with Upward Bound

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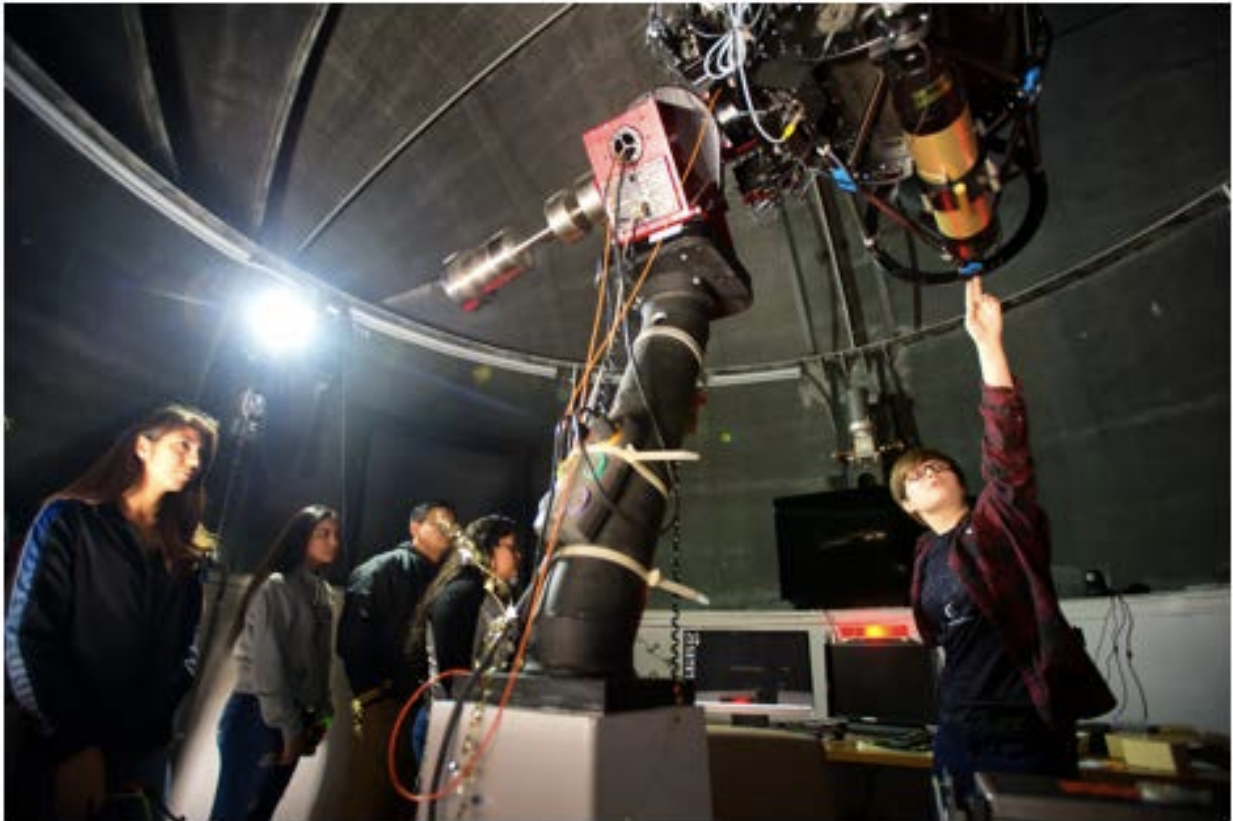
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Science Outreach Collaboration with Upward Bound

By: Anya Kim, James Ottavi, and Kasra Zarei

As part of a science outreach collaboration with Upward Bound, a federal TRIO program that helps first-generation and low-income high school students prepare for postsecondary education, a Saturday symposium event was hosted where Upward Bound students were provided with hands-on, interactive science activities in order to encourage them to pursue careers in science. This submission is a general overview of a pilot outreach activity.



The outreach group and curriculum were developed by Kasra Zarei, in collaboration with other departments, professors, researchers, and student organizations. The workshops and outreach lesson plans can be provided for multiple groups on campus (not limited to Upward Bound).

Offered Workshops

1. Astronomy - Description: Examining images from space – in this session, students will get the chance to observe images of the galaxy. Students will become familiar with the optics behind a telescope and general, related concepts, as well as a foundation of astronomy terms and concepts. Students will get to work with their own Galilean telescope kits while working in teams.
2. Pharmacy - Description: Our collaborators in the Department of Pharmacy will lead students in making lotion/chap stick. Discussion of compounds and chemical processes behind them.
3. Computer Science – Game Design - Description: Developing computer games using Scratch – students will have the opportunity to learn the basics of computer programming and develop games with graphics. Students must develop their own personalized game design; implement and change different features compared to what was shown in the demonstration/teaching game.
4. Neurobiology and Neuroinstrumentation - Description: Students will pipet their own mini-plate of cells while explaining how cell culture works. We will talk to them about fluorescence microscopy and immunohistochemistry – these are lab techniques that are routinely used to study research models related to Stroke. Students will get the chance to observe their cells under the microscope and see different cells light up. Students will be introduced to TENS units (<http://emedicine.medscape.com/article/325107-overview>) and discuss their applications
5. Introduction to Engineering (Electrical, Computer, Biomedical, Chemical, Nano) - Description: Design of circuits and basic instruments with breadboards. Students will learn the foundation of electronics and circuit elements that they can use to design circuits. Applications of circuits in everyday uses will be discussed. Students will learn how to design circuits, specifically those with applications to health-technologies as well as household items. Students will gain some practice working with Arduino devices (i.e. microprocessors) and learn about the programming behind them. Students will also get to perform various demonstrations related to chemical and nanoengineering, specifically common compounds and their chemical properties and use in biomaterials in health care fields.
6. Tour of Medical Imaging Facilities in the UI Hospital - Description: Tour of biomedical imaging facilities. Students will get the chance to tour the new Magnetic Resonance Imaging Facility and see the MRI technologies – there will be enough time for students to volunteer and get imaged as well in the state-of-the-art scanner. Discussion of the science behind CT, MRI, and Ultrasound imaging that is widely used for diagnosing diseases, treatment, etc.
7. Robotics - Description: Demonstration of robot for NASA competition; hands-on robotics activity where students design minirobots using provided kits. Students will learn the robotics and engineering behind designing a robot being used for a national NASA competition

(designed by the University of Iowa students). Students will use their robots to participate in a "sumo-bot" competition.

8. Neuroscience and Microscopy Tour - Description: Students will get to tour the Microscopy facility that all scientists use, and examine different tissues under high-powered electron microscopes (the most advanced imaging technology used). Students will then get to examine the anatomy of real, preserved brains of a human and various other animals.

9. Introduction to the Nanosciences - Description: Students will also get to perform various demonstrations related to chemical and nanoengineering, specifically common compounds and their chemical properties and use in biomaterials in health care fields.

10. Physics and Aeronautics - Description: Students will get to see a demonstration of High-power "boosted dart"/2-stage rocket launch. Students will get to discuss the physics behind propulsion, momentum, impulse, etc., specifically as it relates to rocket launches.