

## **NASA Astrobiology Institute Videocon**

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### **Description:**

The NASA Astrobiology Institute, with eleven lead member institutions and numerous affiliated consortiums, is conducting and integrating ground-breaking multidisciplinary investigations fundamental to the field of astrobiology. The videocon series is organized by the NAI Central Education and Public Outreach Team. The video seminar topics alternate between outreach and research interests and are presented by the respective Principal Investigators and Education and Public Outreach Officers of each of the eleven lead member institutes.

### **Objectives:**

The virtual Institute is distributed across the United States and bound together through advanced telecommunications and electronic networking. The objective is to offer access to the scientific research and outreach projects by these collaborative teams across the country in real time.

### **Web site:**

<http://nai.arc.nasa.gov>. Webcasts of the seminars can be viewed from this site.

### **Audience:**

NASA Astrobiology Institute Members, headquarters, scientists, outreach leads

### **Sponsoring Organization:**

NASA Astrobiology Institute

## **STELLAR/Astrobiology Program**

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### **Description:**

Kids are the next generation of astronauts, engineers and taxpayers who will perpetuate, build and fund the space programs of the future. This is the general philosophy of twelve math and science teachers involved in the NASA Ames Research Center STELLAR Program. STELLAR, which stands for Science Training for Enhancing Leadership and Learning Through Accomplishments in Research, provides kindergarten through 14th grade teachers an opportunity to acquire knowledge of a realistic working view of the conduct of science. Through collaboration with NASA Ames Research Center Scientists and Engineers, teachers are given the opportunity to learn about cutting edge science that will be used in developing science curriculum.

### **Objectives:**

The objective to the STELLAR Program is to bridge the gap between the research community and the next generation of scientists and engineers. As a means to accomplish this objective, teachers work alongside NASA/Ames research scientists using state-of-the-art equipment and research to improve their knowledge and skills in science, math, and technology. The teacher's objective will be to tie the research and the classroom activities into an exciting topic of life science, space science, and astrobiology.

### **Implementation:**

The summer program consists of a five week workshop that involves a combination of research lab work, daily journal entries, attendance to scientific lectures, a visit to the Dryden Flight Research Facility, and an opportunity to "fly" the NASA Ames Research Center simulators. Based upon these experiences, the teachers will develop lesson plans and modules to be extensively tested and refined through classroom use. In addition to the invaluable experiences that the teachers will receive throughout the summer, STELLAR participants will develop a resource base that can be used for a lifetime.

### **Web site:**

[http:// stellar.arc.nasa.gov/stellar/](http://stellar.arc.nasa.gov/stellar/)

### **Audience:**

Educators

### **Sponsoring Organization:**

NASA Astrobiology Institute

### **Project Partners:**

STELLAR

### **Future Plans:**

Although the workshop portion of the program spans a five week period, the STELLAR experience does not end. STELLAR and NASA continues to influence students, colleagues and the participants as throughout the school year. If a teachers can inspire a student to seek a science and technology and show children how science influences the future, then the STELLAR program will be considered a success.

## **Harvard/Smithsonian Public Lectures in Astrobiology**

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### **Description:**

We sponsor lectures for the interested public in Boston and the Washington areas, featuring leading scholars in astrobiological research. Lectures are held three times each semester. We began by scheduling lectures at the Harvard Museum of Natural History, but have expanded to enable lecturers to present a second talk at the National Museum of Natural History, Smithsonian Institution, Washington.

### **Objective:**

To educate the public about the astrobiology and its component sciences.

### **Agenda:**

In 1999

March 15: Kenneth Nealson (Jet Propulsion Laboratory)

April 14: Bruce Jakosky (Colorado)

April 28: Steve Squyres (Cornell)

October 14/15: Sam Bowring (MIT)

November 11/12: Robert Noyes (Harvard/Smithsonian Astrophysical Center)

December 2/3: James Kasting (Pennsylvania State)

In 2000:

April 7/12: Malcolm Walter (Macquarie University, Australia)

May 4/5: John Rummel (NASA)

May 18/19: Jill Tarter (SETI Institute)

### **Implementation:**

The series is set up by the Harvard NASA Astrobiology Institute team and implemented by museum professionals in Cambridge and Washington. Speakers also participate in an informal seminar with faculty and students of the Harvard NASA Astrobiology Institute team.

### **Evaluation of Outreach Activity:**

Attendance Statistics

### **Products Distributed:**

Harvard Natural History Museum Calendar of Events

### **Audience:**

General Public

### **Sponsoring Organization:**

NASA Astrobiology Institute

### **Project Partners:**

Harvard Museum of Natural History, Smithsonian Institution

### **Future Plans:**

We expect to maintain this series as an annual cornerstone of our outreach activities.

## **New Undergraduate Courses**

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### **Description:**

Our principal job as educators is to teach university undergraduate students. Three new courses at Harvard, MIT, and Rochester introduce students to the astrobiological perspective.

### **Objectives:**

To provide undergraduate students with an intellectual framework for thinking about astrobiology and its component disciplines.

### **Agenda:**

MIT: Fall Semester Freshman seminar in Astrobiology (Taught by Samuel Bowring). Rochester: Undergraduate Course in Astrobiology (Taught by Ariel Anbar).

Harvard: Undergraduate Course in Life and Environments through Time (Taught by Paul Hoffman and Dan Schrag).

### **Sponsoring Organization:**

NASA Astrobiology Institute

### **Project Partners:**

Harvard, MIT, Rochester

## **Marine Biological Laboratory Discovery Day**

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### **Description:**

MBL Discovery Day is 'street fair'-type event which opens the Marine Biological Laboratory to the public. Booths showcasing the research going on at the MBL provide educational demonstrations and information. Diana Blazis, of the NASA Center for Advanced Study in the Space Life Sciences at the MBL, made available Astrobiology Institute brochures and educational flyers as part of her exhibit, as well as some of the CD's produced by the STELLAR project. By the happy coincidence of his participation in the Workshop on Molecular Evolution, Carl Pilcher was also on hand for this event. Hundreds of people attended this two hour event.

### **Objectives:**

To introduce the public to the research going on at the Marine Biological Laboratory

### **Audience:**

General Public

### **Future Plans:**

Although Astrobiology did not have a full exhibit this year we hope to expand the exhibit to include some 'hands-on' Astrobiology activities.

## **Teacher Enhancement Workshop: Living in the Microbial World**

### **Description:**

A hands-on workshop for middle and high school teachers focusing on microbial diversity, evolution and metabolic capabilities. Workshop combines lectures from research scientists with extensive laboratory activities using bacteria, protists, and fungi.

### **Objectives:**

- To provide teachers with up-to date content material in the areas of microbial diversity and evolution, and astrobiology, including how microbes have shaped our environment and contribute natural products to our daily lives.
- To convey to teachers the techniques required for using microbes in classroom activities.

### **Evaluation of Workshop:**

Survey of Participants

### **Products Distributed:**

Related readings, classroom exercises

### **Audience:**

Middle and high school teachers

### **Sponsoring Organization:**

Marine Biological Laboratory with funding from Foundation for Microbiology, Pfizer, and NASA Astrobiology

### **Future Plans:**

Participants are asked to give a short workshop for teachers at their home institutions. Additionally, teachers are surveyed as to which activities they incorporated into their classrooms.

## **Alien Hunting TV segment for 4th-7th grade**

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### **Description:**

This multimedia production on the growing new field of Astrobiology examines the methods and equipment modern science uses in its search of its galactic neighbors. WHAT'S IN THE NEWS, an outreach arm of Pennsylvania State Public Broadcasting, in cooperation with PSARC creates and produces the TV segment.

### **Objectives:**

To introduce the exciting new field of astrobiology to upper elementary and middle school students

### **Agenda:**

The program focuses on the efforts of Astrobiologists to understand how life arose on our own planet in order to know where and what to look for beyond Earth. It will be distributed primarily via public television stations to students in 30 states and Iceland. Students will be invited to conduct their own experiments and report the results to WHAT'S IN THE NEWS, which will then include the follow-up on the final program of the series.

### **Implementation:**

The heart of the presentation will be a fifteen minute video for broadcast on the children's current events series WHAT'S IN THE NEWS. WHAT'S IN THE NEWS has been bought by organizations in 30 states and Iceland. A newspaper column for national distribution and a web site with related information and experiments will be a supplement to the broadcast.

### **Web site:**

<http://www.witn.psu.edu/>

### **Products Distributed:**

Alien Hunting

### **Audience:**

Grades 4-7

### **Sponsoring Organization:**

PSARC

### **Project Partners:**

PSARC and Pennsylvania State Public Broadcasting

### **Future Plans:**

WHAT'S IN THE NEWS will continue to include short segments of Astrobiology-related news in their "News Summary" segments that air every two weeks.

## **Graduate Programs**

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### **Description:**

The objective of graduate courses and programs is to engage the student with challenging ideas on how life on Earth originated and if we are alone in the universe.

### **Agenda:**

Astrobiology is the field of science through which humankind will strive to determine whether or not we are alone in the universe, and how life on Earth originated. If we are not alone, what is the nature of extraterrestrial life? UCLA is one of the eleven members of the NASA Astrobiology Institute, and is exceptionally well placed to address these issues because it fosters a group of talented scientists with complementary skills in biochemistry, paleobiology, evolutionary biology, microbiology, molecular biology, isotope geochemistry, geology, astronomy, planetary science, space physics, atmospheric sciences, earth system science, and nonlinear dynamics who work and teach collaboratively. Institutional strengths include the IGPP Center for the Study of Evolution and the Origin of Life (CSEOL); the UCLA ACCESS program for interdepartmental graduate education in molecular biology; the W.M. Keck Foundation National Center for Isotope Geochemistry; and major partnerships in the Keck and SOFIA observatories.

### Graduate Degree Programs:

Astronomy and Planetary Science

Geobiology and Paleobiology

Microbiology and Geomicrobiology

Molecular and Evolutionary Biology

Geology and Geochemistry

### **Web site:**

<http://astrobiology.ucla.edu>

### **Sponsoring Organization:**

University of California, Los Angeles

## **Extraterrestrial Life Class**

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### **Description:**

The course focuses on issues surrounding the origin and evolution of life on Earth, the environmental conditions required for life elsewhere, the potential for life on other planets and satellites in our solar system, the discovery, occurrence, and habitability of extrasolar planets, the potential for intelligent life elsewhere, and the philosophical and societal implications of searching for life elsewhere. We are using the course as a means to teach the general student population what science is, the relationship between science and society, and the role of exploration as a part of science.

### **Objectives:**

Exposure of undergraduates from diverse fields to the issue surrounding astrobiology

### **Agenda:**

Syllabus available on the webpage, course is a combination of lecture and discussion

### **Implementation:**

Course is based on the structure of Dr. Jakosky's book, "The Search for Life on Other Planets"

### **Web site:**

<http://argyre.colorado.edu/life/ETlife.html>

### **Audience:**

Undergraduate

### **Sponsoring Organization:**

University of Colorado, Boulder

### **Future Plans:**

The class is taught currently once a semester; this may change in the future based on availability of instructors.

## **Reaching for the Red Planet**

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### **Description:**

Reaching for the Red Planet is a multi-purpose curriculum focusing on planning a Mars colony. The project entails learning general facts about the planets, learning about the Earth's environment, choosing a purpose for a colony on Mars, and planning and designing a colony on Mars. The students will use drawings, creative writing, research skills, team work, math, and the scientific method to explore their own environment and design an artificial Mars colony. Several assignments, a teacher's tour guide to the planets, a guide to the question of life on Mars, and a guide to current and planned Mars missions are included in Reaching for the Red Planet and experiments for the students to perform in class are explained in detail.

### **Objectives:**

The goal of Reaching for the Red Planet was to produce a Mars curriculum that was comprehensive, matched educational standards, and came from the planetary science perspective.

### **Agenda:**

The project is intended to be taught over 8 semesters at 2-3 hours a week. The Astrobiology part alone would take around 2-3 hours of classroom time to complete.

### **Implementation:**

This teacher supplement is designed to fit into the science curriculum of 4-6 graders; it comes in modules, so it can be taught in whole or in part, depending on teacher preference.

### **Web site:**

<http://lyra.colorado.edu/sbo/mary/redplanet.html>

### **Audience:**

Grades 4-6 can be adapted to grades 7-8 easily

### **Sponsoring Organization:**

Mary Urquhart, University of Colorado, Boulder

### **Project Partners:**

SSI and Fiske Planetarium

### **Future Plans:**

Make the program more overtly and easily applicable to the field of astrobiology.

