Science Outreach Training:  
Trainee Manual

2014
Science on Demand
Science Program to Inspire Creativity and Excellence (SPICE)
Oregon Center for Optics

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Anyone is welcome to apply to for Science Outreach Training. The training outlined here is specifically designed to benefit undergraduate science and education majors.

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Program Overview

Purpose and Goals
The purpose of the Science Outreach Training Series is twofold:

- Provide participants with the skills necessary to present science to diverse audiences in informal settings
- Generate a pool of qualified instructors for UO science outreach programs

Science outreach is a proven method for educating the public, inspiring children to pursue science education and careers, and revitalizing science and education students’ interest in their studies.

Goals for participants:

- Receive meaningful training in safety, presentation skills and outreach pedagogy.
- Gain hands-on experience through fieldwork.
- Demonstrate proficiency through competency products.

Apprenticeship Model
Science Outreach Training focuses on providing participants with a wide range of opportunities to gain experience in conducting outreach in the field. Participants start out as trainees working as volunteer assistants under the mentorship of experienced instructors. After completing the requisite training and field experience they graduate to volunteer instructors who will work with partners on outreach activities. Eventually, they can become lead instructors who develop and direct activities and supervise junior assistants and instructors.

The purpose of this approach is to provide participants with a foundation of knowledge about outreach through workshops and trainings and then to have them observe and assist experienced instructors while gaining hands on skills. Completion of the outreach teaching portfolio ensures that they participate in a range of training and skill building experiences.

Career and Education Benefits
Research in informal science education has shown that outreach not only educates the audience, but also provides many benefits to the instructional staff. Outreach provides the opportunity to build communication skills, to deepen understanding of key scientific concepts and reinvigorates students’ interest in their science and education studies.

Tracks
The training series is divided into two sequential tracks that build on one another. Terminology is as follows.
Assistant Volunteer – A person who has not yet completed the volunteer track training, but has completed the mandatory safety and audience training. This person may volunteer to assist instructors at an outreach activity in a limited capacity.

Assistant Instructor – A person who has completed the level-1 volunteer track of the Science Outreach Training. This person may volunteer to co-teach outreach activities with a senior instructor.

Senior Instructor – This person has completed the level-2 instructor track of the Science Outreach Training. He/she is qualified to lead outreach activities and is eligible (but not guaranteed) to be hired for the Science on Demand or SPICE programs.

Volunteer Track

Participants first complete the volunteer track. This track includes basic training in outreach theory, along with fieldwork and a safety competency. Participants who complete the volunteer track are qualified to volunteer at outreach activities as assistant instructors. Assistant instructors work alongside senior instructors to prepare and present outreach activities and to submit curriculum they have developed to the science on demand program. Completion of this track signifies that the participant has a basic level of training and experience in science outreach.

Instructor Track

Participants who complete the volunteer track may then move on to the instructor track. This track includes a larger fieldwork component and significant competency tasks. Participants in this track will develop a new curriculum document outline an activity.

Program Requirements

Participants are expected to provide the program directors with current contact information and a schedule. Additionally, anyone who wishes to volunteer with the program must complete a criminal background check. Participants are expected to attend all required training, and turn in documentation of elective training to the program director.

When volunteering, participants are expected to conduct themselves in a professional manner consistent with representing the University of Oregon.

By state law University of Oregon employees are mandatory reporters of child abuse and neglect. Volunteers are not considered mandatory reporters but are strongly encouraged to familiarize themselves with the requirements for mandatory reporting and to report any suspicions of child neglect or abuse to the program directors.

Volunteer Track

The volunteer track is designed to provide participants with a foundation of training and experience in science outreach. Completion of the training track makes participants eligible to instruct, on a volunteer basis, with the SPICE and SoD programs. Volunteer track activities must be completed within six months from joining the training series.
Training

Training includes four required workshops and two hours of elective training from any source (with director approval). Possible sources of training include UO Science Outreach Club Meetings, coursework in science outreach or educational pedagogy, and other seminars, or workshops provided in relevant areas. The required trainings are:

- Public Safety in Science Demonstrations*
- Know Your Audience*
- Brain-Based Learning
- Intro to Outreach Pedagogy

Fieldwork

Participants will complete 15 hours of fieldwork in the form of public demonstrations, assisting with workshops or other outreach activities, curriculum development or other related activities. Preparation and development time is included in the total hours. Fieldwork can be completed with SoD/SPICE or any other outreach group such as a UO student club, activities through local K-12 educational organizations, or work with non-profits such as the science factory. Participants will need to submit a Field Hours Log signed by a supervisor to the program director.

Competencies

Competencies are practical activities that demonstrate proficiency with an aspect of science outreach. To complete the volunteer track, participants are required to select a science outreach activity that has at least three elements of concern for safety and write up a safety protocol for the activity. Guidance for how to write up a safety protocol can be found in the Forms & Resources section.

Competencies will be reviewed by a panel including program staff and instructors.

Safety Practicum

The safety practicum is designed to provide a work sample demonstrating proficiency in understanding and predicting potential safety concerns associated with outreach. The safety protocol must include at least three elements of concern. Elements of concern include but are not limited to:

- Chemical handling
- Fire
- Sensitive Audiences
- Facilities Usage

Trainees will get preapproval for the activity that serves as the basis for the safety protocol from program staff.
Instructor Track

The instructor track is designed to provide participants with proficiency in science outreach and qualifies them to take a lead role in developing and implementing outreach as well as directing an mentoring junior instructors. Participants who complete the instructor track will be eligible for paid work with the SoD and SPICE programs. Instructor track requirements must be completed within six months of completion of the volunteer track.

Training

Training includes the four required workshops included in volunteer track training and an additional eight hours of elective training from any source (with director approval). Possible sources of training include UO Science Outreach Club Meetings, coursework in science outreach or educational pedagogy, and other seminars, or workshops provided in relevant areas. Training from the UO Science Club Meetings are limited to a total of four hours. The required trainings are:

- Public Safety in Science Demonstrations*
- Know Your Audience*
- Brain-Based Learning
- Intro to Outreach Pedagogy

Fieldwork

Participants will complete 30 hours of fieldwork in the form of public demonstrations, assisting with workshops or other outreach activities, curriculum development or other related activities. Preparation and development time is included in the total hours. Fieldwork can be completed with SoD/SPICE or any other outreach group such as a UO student club, activities through local K-12 educational organizations, or work with non-profits such as the science factory. Participants will need to submit a Field Hours Log signed by a supervisor to the program director. The 15 hours accrued from the volunteer track training count toward this total as long as no more than one year passes from the date of the first fieldwork.

Competencies

Competencies are practical activities that demonstrate proficiency with an aspect of science outreach. Four competencies are required for completion of the instructor track: safety protocol (see volunteer track), curriculum write up, written exam, and a practical exam.

Competencies (except for the exam which will be graded based on a key and rubric) will be reviewed by a panel including program staff and instructors.

Curriculum Development

Participants will select a discrete outreach lesson that is either a demonstration or hand-on activity and develop a complete write up of the activity that contains all the elements necessary for an instructor to lead the activity. The activity should be designed to last between 30-60 minutes.
Original ideas are encourage, however, activity does not need to be entirely new or unique. Participants are welcome to search the internet and other sources for ideas. Prior to developing the write up, participants must submit the idea in the form of a brief (one paragraph) write up with any associate links (such as videos, images, or web sites) to the program staff for review and approval. Adapting an existing curriculum to a new audience or environment is acceptable so long as the new curriculum is substantially different or augmented from the original. Suggestions for elements and format of the curriculum development competency can be found in the Forms & Resources section.

**Written Exam**

The written exam is designed to establish that the participant has obtained suitable breadth in mastery of science outreach pedagogy and practice. The exam will consist of multiple choice and short answer questions and should take no more than one hour to complete. The test will be administered via the internet and is “open book.”

**Practical Exam**

The final competency before completion of the instructor track training series is a practical examination. The participant will select either a demonstration or hands-on activity to present to a committee of reviewers. The review committee will consist of program staff, and qualified outreach instructors. Other qualified committee members (such as UO faculty) may be requested with director approval.

The practical exam is designed to demonstrate the participant’s ability to assemble the necessary materials and present an outreach activity that is entertaining, engaging, and educational. The participant will be expected to identify the target audience, environment and learning outcomes of the activity.

The committee will review the presentation based on the three criteria of content, safety and presentation skills. The activity should take between 20-30 minutes and may be a subsection of a smaller presentation. The presentation does not need to be original but should be challenging enough to represent the participant’s skill set.

**Forms & Resources**

**Application**

Applications can be submitted online via the SPICE web site (oco.uoregon.edu/spice/volunteer). No recommendation letters or previous experience is required.

**Safety Practicum**

Write up all potential elements of concern for the demonstration. Consider the potential for electric shock, burns, contamination etc.

Detail what equipment and materials have the potential to cause harm and to whom. Determine which procedures will be employed to ensure the safety of the presenters, workshop participants or audience.
Describe potential accidents and what measures will be taken mitigate harm to persons and damage to equipment/facilities.

**Sections to Include in Your Safety Write Up**

Brief Description of the Procedure

List of supplies and equipment that might cause harm or damage

Description of steps in the procedure that have the potential to cause harm or damage.

Measures that will be take to prevent harm/damage.

Steps that will be taken if an accident happens

**Curriculum Development Template**

Every activity requires a clear set of instructions and supporting materials. Below are all the elements that should be included in a curriculum write up.

**Background Information**

Information in this section is for the instructor. It should include important background concepts, clearly list the learning objectives of the lesson, the audience, recommended number or participants, how long the activity should take and any safety concerns. Notes on potential problem areas during the exercise should be included as well. Alternative procedures and elements of the lesson that can be modified for different audiences are also helpful.

**Objective**

What are the expected learning/skills outcomes of the activity. List any extension activities.

**Supplies and Materials**

A complete list of all supplies required for the activity with quantities and how many participants those supplies will accommodate. Notes on possible substitutes for difficult to procure or expensive materials are helpful. Include a complete list of printed materials as well. Clearly indicate if some supplies are for instructor use only. Provide information on when particular supplies should be handed out. Participants should not have possession of supplies until they are needed.

**Experimental Procedure**

Detail the procedure(s) the activity will follow. Use of numbered lists and bulleted points is recommended. Provide all the information necessary to carry out the activity.

**Questions**

Provide a list of questions the instructors can ask participants. These questions should relate to the learning objectives.

**Handouts & Worksheets**
Provide masters of all handouts and informational forms to be given to the participants. Keep handouts as simple and uncluttered as possible. Do not expect participants to read long paragraphs of background information.

References

Provide a complete list of references including where your information came from and suggestions for additional activities.

**Field Hours Log**

<table>
<thead>
<tr>
<th>Field Hours Log</th>
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<tbody>
<tr>
<td>Name: ___________________ UO ID: ___________________</td>
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<tr>
<td>Signature: ___________________ Date: ____________</td>
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<table>
<thead>
<tr>
<th>Activity Information</th>
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<tbody>
<tr>
<td>Activity Title: ___________________</td>
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<tr>
<td>Activity Description: ___________________</td>
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| Preparation/Setup/Clean Up Hours: ___________________ |
| Outreach Activity Hours: ___________________ |
| Curriculum Development Hours: ___________________ |
| **Total Hours**: ___________________ |

| Supervisor Signature: ___________________ Date: ____________ |
| Supervisor phone/email: ___________________ |
# Training Portfolio

Name: ___________________________  UO ID  __________________
Signature: ___________________________  Date: ____________

## Level 1 Volunteer Track

<table>
<thead>
<tr>
<th>Training Required</th>
<th>Dates</th>
<th>Test</th>
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<tbody>
<tr>
<td>Public Safety in Science Demonstrations</td>
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<tr>
<td>Know your audience</td>
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<tr>
<td>Brain-Based Learning</td>
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<tr>
<td>Intro to Outreach Pedagogy</td>
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**Elective (2 hours)**

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**Field Hours (15 hours)**

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**Competency**

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<th>Safety Practicum</th>
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<th>Approval</th>
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Approval ___________________________  Date ____________
Name: _______________________________ UO ID: ____________________
Signature: _______________________________ Date: ____________________

Level 2 Instructor Track

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<td>Public Safety in Science Demonstrations</td>
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<td>Know your audience</td>
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<td>Brain-Based Learning</td>
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<td>Intro to Outreach Pedagogy</td>
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<tr>
<td>Elective (10 hours)</td>
<td>Dates</td>
<td>Hours</td>
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<tr>
<td>Field Hours (30 hours)</td>
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Competency

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<td>Curriculum Development</td>
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Approval: ___________________________ Date: ________________
References