

## Course Syllabus

### Title

Inquiry in Science Education

### Target Audience

This course is intended for pre-service and in-service teachers of life science in grades 9-12.

### Prerequisites

To successfully participate and complete the assignments in this course, the learner must:

- Be familiar with taking an online course or have completed the PBS “Practice Learning Online with TeacherLine” course.
- Have some experience in grades K-12 classrooms.
- Have an interest in life, earth and space sciences.

### Course Description

This course focuses on three elements: inquiry and other teaching strategies, and use of multimedia and visualization tools in teaching and learning about inquiry in science education. Inquiry in Science Education examines how using inquiry-based teaching and learning strategies can improve students’ understanding of science. Through the readings, videos, discussions, assignments, and other interactive experiences, learners in this course will have multiple opportunities to develop content knowledge about inquiry in science education and the processes of science. Learners will experience a rich multimedia, inquiry-based learning environment as their students ideally would in their own classrooms. The course provides effective teaching methodologies, strategies and tools that can be used when teaching life science concepts.

### Instructor/Facilitator

See instructor/facilitator sheet.

### Credits

To be determined by college or university.

### Course Goals

As a result of participating in this course learners will:

- Explore how to bring the scientific process into the classroom as a teaching and learning tool; and
- Understand the essential elements of classroom inquiry.

### Outline of Content and Assignments

Learners in this course are expected to participate in discussions and complete assignments. Learners are also expected to keep a personal notebook (which is not assessed) to keep notes, complete exercises and record reflections about their learning experiences in this course.

### Discussion Activities

- **Essential Question** – Each session includes a discussion about an essential question and teaching and learning issues related to this question. Learners post responses to questions posed in the course and respond to posts submitted by their colleagues.

**Assignments** - Learners are expected to submit assignments. Rubrics are provided for assessment of all assignments, and the course content includes assignment samples.

Assignments in this course include:

- **Writing Assignments** - Short writing assignments (essays) are submitted to the facilitator.

Inquiry in Science Education Syllabus

1 of 3

### Required Readings

- “Nature of Science”
- “The Nature of Science”
- “On Scientific Method”
- “Does Sea-Water Kill Seeds”
- “Teaching for Conceptual Change: Confronting Children’s”
- “View Science Learning From a Constructivist Perspective”
- “The Fallacy of Induction in Science Teaching.”
- “Images of Inquiry: Another Image of Inquiry in Grades 9-12”
- “Continuum Chart from Inquiry and the National Science Standards”
- “Frequently Asked Questions About Inquiry”
- “Steve’s Story”
- “Convergence Marsupials and Placentals”

### SESSION 1: PROCESSES OF SCIENCE

**Objectives** - After completing this session, learners will be able to:

- Describe how science and scientists follow systematic processes of making observations, asking questions, making predictions, taking measurements, collecting data, and drawing conclusions based on evidence;
- Describe how scientific knowledge can change in light of new evidence or interpretations; and
- Identify ways to bring the scientific process into the classroom as a teaching and learning tool.

Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. The **Essential Question** for this session is: ***What processes do scientists follow in their investigations of the natural world?***

Activities in this session delve learners into identifying processes common to all scientific investigations and exploring how using similar approaches in the classroom can foster habits of mind students need to understand how science works and how to conduct their own scientific research.

Assignments in this session require learners to identify the processes scientists follow to answer questions about the natural world and describe the steps involved in scientific investigations.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

### SESSION 2: INQUIRY-BASED LEARNING

**Objectives** - After completing this session, learners will be able to:

- Identify and describe the essential elements of classroom inquiry; and
- Discuss how one or more inquiry-oriented teaching strategies could be incorporated into their own teaching practice and what the advantages might be.

Using an inquiry-based approach, the session is divided into the following sections: Invitation, Exploration, Explanation, Application and Putting It into Practice. . The **Essential Question** for this session is: ***What role can inquiry-based approaches play in science education?***



Activities in this session delve into the benefits of an inquiry-based approach to teaching biology. Learners will learn to assess levels of inquiry in various classroom activities, including their own, and then develop and practice strategies for increasing active learning.

Assignments in this session require learners to demonstrate an understanding of the continuum for each of the five essential features of classroom inquiry, explain how they would use resources as part of an inquiry-oriented activity on evolution, and to use the concepts and tools they've encountered in the course to help them design sample lesson modifications and analyze the effectiveness of their approach.

Discussions in this session focus on finding solutions for the essential question for this session.

Learners will record notes and reflections in their personal notebook about different concepts, methods, activities and ideas presented throughout the session.

### **Schedule**

This course is scheduled to take approximately 30 hours to complete.

### **Requirements**

Learners are expected to:

- Complete all assignments.
- Participate and actively engage in discussions with fellow learners while contributing to the social construction of knowledge.
- Be self-directed and self-motivated.
- Ask for assistance when they need it.

Facilitators are expected to:

- Provide feedback to all learners.
- Participate in discussions to keep them moving forward.
- Provide assistance to learners who need it.

### **Technical Requirements**

- Word Processor
- Internet service provider
- E-mail
- Shockwave and Flash: <http://www.macromedia.com/downloads/>
- Acrobat Reader: <http://www.adobe.com/products/acrobat/readstep.html>
- QuickTime: <http://www.apple.com/quicktime/download/>

### **Standards of Academic Integrity**

As posted on PBS TeacherLine Web site at

[http://teacherline.pbs.org/teacherline/help/help\\_template3.cfm?subID=197](http://teacherline.pbs.org/teacherline/help/help_template3.cfm?subID=197)

### **Evaluation**

This course is evaluated on a letter grade basis, and graduate credit may be available. See the PBS TeacherLine Web site for details pertaining to specific graduate credit instructions.

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