ECOLOGY PROJECT
INTERNATIONAL

Galapagos: A Living Laboratory
Teaching Science with NGSS Experiential Learning

Course Description:
Ecology Project International's educator courses provide teachers with opportunities to participate in authentic research and conservation projects while they develop ecological knowledge and hone science and engineering practices. Participants will learn strategies and tools to inspire their students to observe, question, make claims, and conduct independent scientific research using the NGSS framework and the 5E Model of Instruction. Participants will access pre-course materials and resources in a virtual setting, participate in research, experiential learning, lesson development and collaboration in the field, upload a completed lesson to the virtual classroom after field work is completed, and have access to templates and resources to support and guide lesson development throughout the experience.

Expected Student Learning Outcomes:
Upon completion of the course, participants will have gained experience in:

- reading and interpreting the NGSS for use in their classroom
- creating lessons that align with the NGSS using the 5E Learning Cycle
- understanding and correctly implementing a variety of field research methods
- using research supported teaching methods, tools, and strategies for supporting students in growing their science and engineering practices

Pre-Course Work (completed via Google classroom):
Approximately 5 weeks prior to the field course participants will be invited to a Google classroom to complete several assignments & access pre-course resources. Participation in the classroom is recommended for all participants but required for those seeking graduate credit.

Topic	Assignment(s)
Fundamentals of 3-Dimensional Learning Next Generation Science Standards	Complete all of the assignments and review all of materials and resources in **the 3-Dimensional Learning Section** of the Google Classroom. Using the NGSS Read the Standards search tool, select the grade and discipline associated with the class(es) you will be teaching next year. (If you are not sure what you will be teaching next year, choose the grade and discipline that you want to learn about most.) Next choose a Disciplinary Core Idea (DCI). Click submit. From the list generated by the search, choose four performance expectations you would like support in developing lesson plans for while you are on your EPI field course. Screenshot the performance expectations and submit them online. In addition, print the performance expectations to bring with you to the field experience.

5E Learning Cycle	Complete all of the assignments and review all of the materials and resources in the Introduction to the **5E Learning Model Section** of the Google Classroom. Read: EPI Education Handbook pages 31 - 38 on the 5E Learning Cycle For each of the four performance expectations you selected when you completed the NGSS pre-course work, describe an Engagement activity you could do with your students in the classroom and an engagement activity you can do out of the classroom. For each performance expectation, describe an assessment you might use to evaluate students in their understanding of the performance expectation. Print hard copies of your descriptions and bring them with you into the field.
Ecology and Biology of Field Location	-Read: Articles on the biology, ecology, and culture of the field site you will be working in. -Watch: Videos on the biology, ecology, and culture of the field site you will be working in. -Do: Please answer each of the following questions thoroughly and submit them online. • What are the largest ecological threats to the area you will be visiting and why? • What are some of the projects local conservationists are working on to mitigate the impact of these environmental challenges? • Which of the environmental challenges facing the area you will be visiting are similar to environmental challenges facing your home community? • What is the difference between a tourist and a traveler? Which word (tourist or traveler) best describes the experience you hope to have on the field portion of your EPI course and why?
Building Community Partnerships	-Read: Secrets to Snagging Great Science Partners -Research: Use the Internet and/or community networking to create a list of conservation organizations or individual conservation biologists in or near your community. Complete the following questions and submit them online. Please also keep a hard copy of your answers to bring into the field. • Describe the work the organization or person is doing. • Explain how knowledge of or participating in this work could support student learning. • Describe the biggest barriers you see for bringing your student out into the field to participate in this work.

Please bring a binder or folder with provided pre-course readings and written assignments printed for your use in the field.

Field Course Work and Itinerary:

Specific research and conservation activities are dependent upon the EPI field-course location. EPI Professional Development will provide teachers with experiences that develop their knowledge and skills to integrate environmental field studies into their school curriculum. Each of the field programs supports participants as they develop inquiry-based lessons built on phenomena identified during experiences in the field, provides field research and conservation experiences and opportunities, offers an introduction to Environmental

Literacy and how to foster environmental stewardship, and taps into the true joy of interacting with nature. Participants also develop a network with peers, instructors, and researchers to support them after their course experience.

Core Course Activities and Lessons:

Specific research and conservation activities are dependent upon the EPI field-course location. However, each course will have a blend of each of these components.

- **Field research and conservation experiences**: EPI partners with research and conservation organizations to engage participants in on-the-ground research or conservation. Teachers will become community researchers and contribute to research and conservation outcomes all the while building knowledge and understanding of field research and conservation techniques and the underlying ecological science principles.
- **Model student activities:** Teacher participants will step into the role of students to broaden their knowledge of the environments, organisms, and cultures that are their classroom for their course as well as build the skills they'll need to engage in the research and conservation experiences.
- **Pedagogy Workshop**: Through a mix of reflection, direct instruction, self-guided exploration, discussions, and practice, teachers will refresh and expand their understanding and capacity to deliver high quality three-dimensional science lessons to their students. Authentic research experiences and model student activities serve as an example and launching point for exploring pedagogy, science concepts, the NGSS, the 5E learning model, and more.
    - CCCs and 5Es (1 hr)
    - From Phenomena to Inquiry Lesson (2 hr)
    - 3D Techniques: Questioning, Discussion, Claim-Evidence-Reasoning (2 hr)
    - Environmental Literacy / Education Framework (2 hrs)
- **Curriculum Writing Workshop:** Experiential learning is fundamental to all EPI experiences. For teachers, we'll engage their creativity, knowledge, and skills as teachers in a guided curriculum building progression following the 5E learning cycle. Throughout the process, teachers will share what they know and learn from their peers. Teachers will share lesson plans with their peers during the program, sending each teacher home with new ideas and materials that they can apply in their classrooms. Following the course, teachers can use the online classroom to share finalized lesson plans, resources, photos, additional opportunities, and more.
    - 5E Learning Cycle lesson plan template and lesson creation time. (1 hr)
    - Lesson creation / collaboration time (multiple sessions – 2 hrs each)
    - Lesson plan presentation and peer feedback (2 hrs)
- **Fundamental group facilitation:** EPI courses are dynamic events bringing together people from different backgrounds, skills, goals, and personalities. During the course, EPI will utilize a variety of techniques to foster group understanding, cooperation, teamwork, cohesion, and health. These activities occur throughout the day and typically involve ~ 1 hr of time each day.
- **Have fun!** Everything we do is fun; we'll make sure we take some time out from learning to enjoy the location, people, and experiences we're having.

Optional College Credit:

Interested participants can receive **4 graduate credits** through Hamline University for participating in this workshop. Separate registration and tuition fees are required. Contact your course coordinator for more information if you are interested.

Assessments:

You will be assessed on the following tasks:

- **Pre-Course Reading and Assignments** – Reading and writing assignments on the topics listed in pre-course work assignments section above. All pre-course assignments must be completed prior to departure to the field location.
- **Field Journal** – Each day you will use your journal for lessons, activities, and reflection. The journaling process is intended to support you in both your personal learning journey and as a model for how to utilize field journals with your own students. Your journal will be assessed at the end of the field course.
- **Field Participation** – Each day you will be participating in unique field research and conservation activities. Full engagement is expected, and you will earn points for participation in group discussions, effort in learning field research techniques, making observations and asking questions, and being ready and willing to try new things.
- **Lesson Plan Presentation** – At the end of the course you will present the lesson plan you have created during your time in the field. This lesson plan will use the 5E Learning Cycle and align with the NGSS. After the course we will ask you to share your lesson plan on the Google Classroom as we work to build a lesson library resource.

Grading Method:

Each of the assessments listed above will be counted toward your final grade in the following manner:

Task	Due Date	Maximum Points Earned (Graduate Level Course)
Pre-Course Reading and Assignments	2 weeks prior to course start date	20
Field Participation	Daily on course	35
Field Journal	End of course	20
Lesson Plan Presentation	Last day of course	25
Total Points	70 required to receive credit	**100**

Required Course Materials:

- Field Journal
- Two mechanical pencils with eraser
- All print outs listed in the Pre-Course Work
- All items on EPI field site packing list

Course Itinerary:

Example course itinerary is included below. Subject to modification due to logistics, activity opportunities, weather, etc.

Day of Course	Course Activities and Lessons Galapagos 10-day sample itinerary
Day 1	• Arrival to Quito

2
 	
Travel to GA
	• **Fundamental Group Facilitation:**
	  ○ Personal introductions, Team building and group cohesion activities
	  ○ Orientation to accommodations
	  ○ Safety and medical procedures
	  ○ Overview of the course
	  ○ Group Agreement
	• **Research/Conservation Activity**:
	  ○ Tortoise monitoring protocol
	• **Model Student Activity**:
	  ○ Tortoise Basics

3	• **Research/Conservation Activity**:
	  ○ Tortoise Monitoring
	• **Model Student Activity**:
	  ○ Data review
	  ○ Galapagos Unique
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

4	• **Research/Conservation Activity**:
	  ○ Invasive snail data collection & control
	  ○ Microplastics monitoring protocol
	• **Model Student Activity**:
	  ○ Invasive Species Basics
	• **Pedagogy Workshop**:
	  ○ CCCs and 5Es
	• **Have Fun!**:
	  ○ Lava Tunnel Tour
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

5	• **Research/Conservation Activity:**
	  ○ Microplastic monitoring at Tortuga Bay
	• **Model Student Activity**:
	  ○ Mola Mola eco-club – cultural exchange
	• **Pedagogy Workshop**:
	  ○ From Phenomena to Inquiry Lesson
	• **Curriculum Writing Workshop**:
	  ○ 5E Learning Cycle lesson plan template and lesson creation time
	• **Fundamental group facilitation:**
	  ○ Morning opening: Team building/group cohesion activities
	  ○ Evening closure: Team building and group cohesion activities
	• **Have Fun!**:
	  ○ Hike to Turtle Bay! Wildlife viewing & snorkeling
	  ○ Ice Cream

6	• **Research/Conservation Activity**:
	  ○ Marine census/transects (snorkel)
	• **Model Student Activity**:
	  ○ Marine Life Lesson
	  ○ Data review
	• **Pedagogy Workshop**:
	  ○ 3D Techniques: Questioning, Discussion, Claim-Evidence-Reasoning
	• **Have Fun!**:
	  ○ Charles Darwin Station visit
	  ○ Puerto Ayora pier visit
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

7
 	
Transfer Santa Cruz - Isabella
	• **Pedagogy Workshop**:
	  ○ NGSS afternoon activity
	• **Curriculum Writing Workshop**:
	  ○ Lesson creation / collaboration time
	• **Have Fun!**:
	  ○ Wetland boardwalk hike
	  ○ Turtle Breeding Center Visit
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

8	• **Model Student Activity**:
	  ○ Habits of a consumer class
	• **Curriculum Writing Workshop**
	  ○ Lesson creation/collaboration time
	• **Have Fun!**:
	  ○ Tintoreras tour (snorkel, wildlife observation, islote visit)
	  ○ Open afternoon
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

9
 	
Transfer Isabella – Santa Cruz
	• **Model Student Activity**:
	  ○ Threats to oceans
	  ○ Sunset reflection
	• **Curriculum Writing Workshop**
	  ○ Lesson plan presentation and peer feedback
	• **Fundamental group facilitation:**
	  ○ Morning opening/ Evening closure: Team building/group cohesion activities

10 Return to Quito (late afternoon)	• **Model Student Activity**: • Course graduation • **Fundamental group facilitation:** ○ Course feedback & evaluations
Total PD Hours	**48 hours**