

# Introductory Courses in Earth Sciences

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All of the courses listed below are entry-level courses offered through Earth Systems, Energy Resources Engineering, Geological & Environmental Sciences, and Geophysics. There are no prerequisites; some have recommended background. Many fulfill GERs. Entry to freshman and sophomore seminars (indicated by N and Q, respectively) requires filling out an online application through Freshman and Sophomore Programs. For more information, refer to the Bulletin and Time Schedule.

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## Autumn Quarter

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EarthSys  
15SI

### Reducing Stanford's Carbon Footprint

*Stephen Schneider*

This student-initiated course will include guest lectures and field trips to local energy-efficient buildings. Students evaluate a campus building for submission to Facilities and Operations. Group project focused on reducing Stanford's carbon emissions.

2  
units



EarthSys  
180B

### Local Sustainable Agriculture *(also offered Spring quarter – may be repeated for credit)*

Field-based training in ecologically sound agricultural practices at the Stanford Community Farm; guest lectures from Bay Area farmers, agricultural educators, and food policy advocates; and a field trip to an educational farm.

1  
unit



GES 1

### Dynamic Earth: Fundamentals of Earth Science *(also offered Spring quarter)*

*Hannah Scherer*

An activity-based course in which you will spend time exploring processes that shape the landscape. Several **field trips** during class to local examples, and an all-day field trip to the coast. **Satisfies GER:DB-NatSci**

4  
units



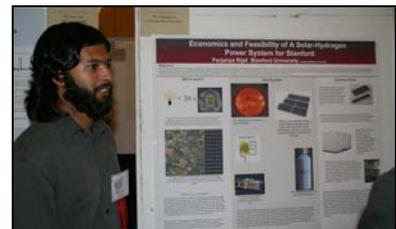
GES 3

### Current Topics in the Earth & Environmental Sciences *(also offered Winter quarter)*

*Anne Egger and others*

The goal of this seminar is to introduce you to the range of research that is conducted in the School of Earth Sciences. Faculty from all departments in the school will give a weekly lecture, assuming no background knowledge.

1  
unit



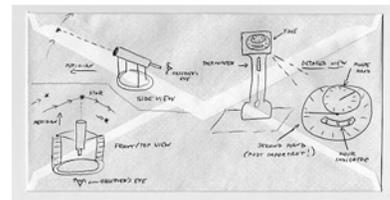
GES 37N

### Energy & the Environment on the Back of an Envelope

*Ken Caldeira*

Problem-solving and discussions to develop a quantitative understanding of which energy sources might be scaled up to satisfy long-term global energy demand while preserving our environment. **Satisfies GER:DB-NatSci**

3  
units



GES 42N **Landscapes and Tectonics of the Bay Area** 4  
*George Hilley* units

The diverse landscapes of the Bay Area result from active faulting and erosion. **Field excursions** will introduce concepts and skills through investigation of the local valley, mountain, and coastal areas. **Satisfies GER:DB-NatSci**



GES 191 **Field Trips: Thanksgiving Break in Owens Valley and the White Mountains** 1  
*Hannah Scherer* unit

**November 17-21 field trip** to Owens Valley, site of volcanic activity, hot springs, earthquakes, all in the shadow of the Sierra Nevada. Stay in Bishop, CA. **\$100 cost.**



Geophys 25 **Hands-on Intro to Astrobiology** 3  
*Norm Sleep* units

Are human beings alone? Are microbes common in the universe? **Outdoor lab experiments** recreate the historical development of our modern understanding of space and time, and are designed to work in K-12 classrooms.



Geophys 123: **Earth Sciences and War, Archaeology, National Security, Global Warming, & Music** 1  
*Amos Nur* unit  
*One time only offering*

Topics include oil and war, Yergin's *The Prize*, earthquakes and archaeology, petroleum and national security, global warming and Al Gore's *An Inconvenient Truth*, earth systems and music, Gustav Mahler's Third Symphony.



## Winter Quarter

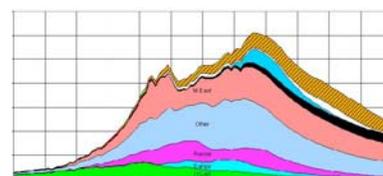
EarthSys 10 **Introduction to Earth Systems** 4  
*Gary Ernst* units

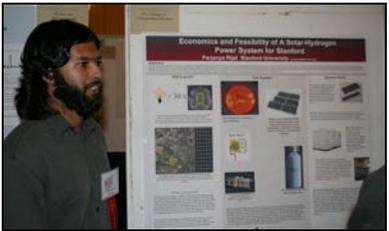
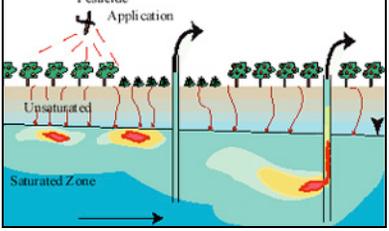
A multidisciplinary approach to case studies using the principles of geology, biology, engineering, and economics to describe how the Earth operates as an integrated, interconnected system. **Satisfies GER:DB-NatSci**



EarthSys 45N **Energy Issues Facing the World** 3  
*David Howell and Steve Graham* units

This core of this course is a game simulation of energy resources and policy in countries around the Pacific. You will develop an energy profile, and see how geologic and economic factors influence policy.



Energy 101	<p><b>Energy and the Environment</b>  <i>Tony Kavscek, Lou Durllofsky, and Margot Gerritsen</i>                  How we use energy in modern society, the consequences of that energy use on environment and economies, and estimates of resources available for use in the future.  <b>Satisfies GER:DB-EngrAppSci</b></p>	3 units	
GES 2	<p><b>Earth System History</b>  <i>Hannah Scherer</i>                  The evolution of Earth's systems from earth formation to present. Topics include the evolution of life, origin of the oceans, atmosphere and continents, and changes in climate through time, setting the stage for understanding modern climate change. <b>Satisfies GER:DB-NatSci</b></p>	3 units	
GES 3	<p><b>Current Topics in the Earth &amp; Environmental Sciences</b> (<i>also offered Autumn quarter</i>)  <i>Anne Egger and others</i>                  The goal of this seminar is to introduce you to the range of research that is conducted in the School of Earth Sciences. Faculty from all departments in the school will give a weekly lecture, assuming no background knowledge.</p>	1 unit	
GES 38N	<p><b>The Worst Journey in the World: What Drives Polar Exploration</b>  <i>Rob Dunbar</i>                  Through reading accounts written by polar explorers, students focus on the main scientific and geographic achievements of polar exploration. Includes an <b>optional winter dog-sled trip</b> to the Sierra.</p>	3 units	
GES 43N	<p><b>Environmental Problems</b>  <i>Keith Loague</i>                  Addresses the various components of multidisciplinary environmental problems and questions associated with regulatory decision-making. Topics include groundwater contamination, watershed effects related to timber and mining practices, and acid rain. <b>Satisfies GER:DB-NatSci</b></p>	3 units	
GES 49N	<p><b>Field Trip to Death Valley and Owens Valley</b>  <i>Gail Mahood</i>                  The focus of this course is a <b>six-day field trip</b> to Death Valley and Owens Valley during spring break. Meetings during winter quarter involve rock and mineral identification and fundamental geologic concepts. <b>Satisfies GER:DB-NatSci</b></p>	3 units	

GES 55Q **The California Gold Rush: Geologic Background and Environmental Impact** 3 units

*Dennis Bird*

You will investigate the geologic processes that led to concentration of gold in the river gravels and rocks in the Mother Lode & the environmental impact of mining operations. Satisfies **WRITE-2** and **GER:DB-NatSci**



GES 191 **Field Trips: STAY TUNED...** 1 unit  
Spring Break field trip to???

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## Spring Quarter

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EarthSys 180B **Local Sustainable Agriculture** (also offered Autumn quarter – may be repeated for credit) 1 unit

Field-based training in ecologically sound agricultural practices at the Stanford Community Farm; guest lectures from Bay Area farmers, agricultural educators, and food policy advocates; and a field trip to an educational farm.



Energy 102 **Renewable Energy Sources and Greener Energy Processes** 3 units

*Tony Kavscek and Roland Horne*

What is the potential for renewable energy? How can geothermal, wind, solar, biomass, and tidal energies be converted to useful forms and stored? Satisfies **GER:DB-EngrAppSci**



Energy 104 **Technology in the Greenhouse** 3 units

*Franklin Orr*

Discussion of technologies that may be used to reduce emissions of greenhouse gasses like methane, carbon dioxide, and nitrous oxide, as well as particulates like black soot. What are the limits of these technologies, and how can renewable energy sources contribute?



GES 1 **Dynamic Earth: Fundamentals of Earth Science** (also offered Autumn quarter) 4 units

*Hannah Scherer*

An activity-based course in which you will spend time exploring processes that shape the landscape. Several **field trips** during class to local examples, and an all-day field trip to the coast. Satisfies **GER:DB-NatSci**



GES 8 **The Oceans: Intro to the Marine Environment**

3  
units

*Jim Ingle*

How did the oceans evolve and how are they changing now? How do the oceans affect our climate? What happens at the boundary between the ocean and the continents?  
**Satisfies GER:DB-NatSci**



GES 46N **Exploring the Critical Interface between the land and Monterey Bay: Elkhorn Slough**

3  
units

*Chris Francis*

Students will explore Elkhorn Slough as a model ecosystem for understanding the importance and complexity of estuaries. Includes **field trips** to sites in the Slough, one of California's largest and last coastal wetlands.

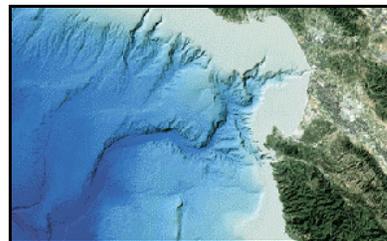


GES 56Q **Changes in the Coastal Ocean: The View from the Monterey Bay**

3  
units

*Rob Dunbar*

Using the Monterey and San Francisco Bays as examples, this seminar will investigate recent changes in climate, land use, and coastal ocean practices and conditions. Includes several **field trips** in the Bay Area.



Geophys **The Water Course**

104

*Rosemary Knight*

The pathway that water takes from rainfall to the tap using students' hometowns as examples. How the geological environment controls the quantity and quality of water, and current water supply issues in the US and abroad. **Satisfies GER:DB-NatSci**

3  
units

