



# INTERDISCIPLINARY MINOR IN SUSTAINABLE ENERGY

The Energy Institute and the School of Global Environmental Sustainability are proud to offer this new Minor in Sustainable Energy for students who recognize the need to break down the traditional barriers that separate the science and engineering of energy from the social, economic and political dimensions of energy. The Minor in Sustainable Energy offers undergraduate students, regardless of their major, an opportunity to gain a deeper knowledge of the many dimensions of sustainable energy.

## THE FUNDAMENTAL CONCEPTS OF ENERGY

Citizens in all walks of life make choices about energy that have profound implications for society and for the planet. And yet, the basic concepts and vocabulary of energy remain out of reach for most citizens. Students in this new minor will gain a common language of energy basics that will enable the kind of interdisciplinary teamwork and problem solving that are needed in the transition to a sustainable energy future.

## ENERGY RESOURCES—WHAT ARE OUR OPTIONS?

Fossil energy has allowed our technological society to innovate and grow at a spectacular pace. But, what is the future of fossil energy as a resource? How do we understand the limits, benefits and trade-offs of fossil versus other forms of energy such as nuclear, wind, solar and biomass? How do we assess these questions while avoiding the polarizing hyperbole that often surrounds them? These are questions that students in this new minor will be able to tackle.

## RETHINKING ENERGY—WHAT IT MEANS TO BE SUSTAINABLE

The transition to sustainable energy involves much more than shifting from fossil to renewable resources. Sustainability requires understanding energy as a human-directed system—from extraction and production to consumption—that operates within the constraints of human society and Earth's ecosystems. In the capstone course for the minor, students will develop skills and use tools for systems thinking such as life cycle assessment, techno-economic analysis and system dynamics modeling as part of their own efforts to analyze options for sustainable energy.

*We must hope that during the twenty-first century humanity will work out a new balance between adequate energy use to sustain a decent quality of life and the imperative of not affecting the biosphere in ways inimical to human survival.*

*—Vaclav Smil, **Energy in Nature and Society** (2008)*

**Vaclav Smil—a renaissance energy analyst, global thinker and role model for students of sustainable energy.**

Smil has authored 37 books and countless papers on energy and its relation to nature, society, history, food, technical innovation and public policy. In 2010, he was named by *Foreign Policy* as one of the top 100 global thinkers. Included among his fans is Microsoft co-founder Bill Gates, who has read all of his books.



**ENERGIZE YOUR DEGREE**

<http://www.energy.colostate.edu/p/for-csu-students>



**SCHOOL OF GLOBAL ENVIRONMENTAL SUSTAINABILITY**  
COLORADO STATE UNIVERSITY

# INTERDISCIPLINARY MINOR IN SUSTAINABLE ENERGY CHECKLIST

The Energy Institute and the School of Global Environmental Sustainability are proud to offer a minor in Sustainable Energy providing students with a background in sustainable energy in all its dimensions—the social, economic, physical and biological, and technological.

**KEY:** F: FALL, S: SPRING, O: ONLINE; (E)/(O): EVEN/ODD YEARS, SS: SUMMER SESSION

## Required courses (9 credits required)

	Course code	Course title	Offered	Credits	Pre-requisites
<input type="checkbox"/>	GES 101	Foundations of Environmental Sustainability	F,S,O	3	
<input type="checkbox"/>	GES 141	Introduction to Sustainable Energy	F	3	
<input type="checkbox"/>	GES 441	Analysis of Sustainable Energy Solutions	S	3	GES 141

## Group A Social and economic aspects (Choose 2)

(6 credits minimum, 3 credits upper division)

	Course code	Course title	Offered	Credits	Pre-requisites
<input type="checkbox"/>	AREC/ECON 202	Principles of Microeconomics, (AUCC 3C)	F,S,SS	3	MATH 117,118, 141, 155 or 160
<input type="checkbox"/>	AREC/ECON 240	Issues in Environmental Economics, (AUCC 3C)	F,S,SS	3	
<input type="checkbox"/>	ECON 344	Economics of Energy Resources	S(O)	3	ECON 202 or AREC 202.
<input type="checkbox"/>	ESS 542	Greenhouse Gas Policies	S	2	ESS 524.
<input type="checkbox"/>	NR 320	Natural Resources History and Policy	F,S	3	
<input type="checkbox"/>	POLS 101	American Government and Politics, (AUCC 3C)	F,S,SS	3	
<input type="checkbox"/>	POLS 364	U.S. Energy Policy Analysis		3	POLS 101

## Group B Scientific and technological aspects (Choose 2) Note: continued on next page

(6 credits minimum, 3 credits upper division)

	Course code	Course title	Offered	Credits	Pre-requisites
<input type="checkbox"/>	ATS 150	Science of Global Climate Change	S	3	
<input type="checkbox"/>	ATS 350	Introduction to Weather and Climate	F	2	
<input type="checkbox"/>	ATS 351	Introduction to Weather and Climate Lab	F	1	
<input type="checkbox"/>	ATS 555	Air Pollution	S(O)	3	CHEM 113 & (MATH 261 or 340) & (PH 122 or 142)
<input type="checkbox"/>	BZ 104	Basic Concepts of Plant Life (AUCC 3A)	F,S,SS	3	
<input type="checkbox"/>	BZ 120	Principles of Plant Biology, (AUCC 3A)	F,S	4	
<input type="checkbox"/>	BZ 332	Introductory Phycology	F(E)	4	BZ 120 or LIFE 102 & BZ 220.
<input type="checkbox"/>	BZ 353/NR 353	Global Change Ecology, Impacts and Mitigation	S	3	LIFE 320 or 220 or LAND 220.

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## Group B Scientific and technological aspects (Choose 2)

(Note: continued from previous page)

	Course code	Course title	Offered	Credits	Pre-requisites
<input type="checkbox"/>	CBE 210	Thermodynamic Process Analysis	S	3	CBE 201 & MATH 26
<input type="checkbox"/>	CHEM 103	Chemistry in Context, (AUCC 3A)	F,S,SS	3	
<input type="checkbox"/>	CHEM 107	Fundamental of Chemistry, (AUCC 3A)	F,S,SS	4	MATH 117 or 141, or concurrently w MATH 155 or 160 or 161 or 229 or 261
<input type="checkbox"/>	CHEM 111	General Chemistry I, (AUCC 3A)	F,S,SS	4	MATH 118,141,155,160,161, 229 or MATH 261 & CHEM 105
<input type="checkbox"/>	CHEM 117	General Chemistry I for Chemistry Majors	F	3	MATH 118 or 141 or 155 or 160 or 161 or 229 or 261
<input type="checkbox"/>	CON 476	Sustainable Practices-Design and Construction	F	3	
<input type="checkbox"/>	ESS 210/GR 210	Physical Geography	F,S	3	
<input type="checkbox"/>	ESS 311	Ecosystem Ecology	F	3	ESS 211
<input type="checkbox"/>	ESS 524	Foundations for Carbon/ Greenhouse Gas Mgmt	F	3	BZ 300 to 499 or ECOL 300 to 499 or CHEM 300 to 499
<input type="checkbox"/>	ENGR 501	Foundations of Systems Engineering	F,S	3	
<input type="checkbox"/>	ENGR 530	Overview of Systems Engineering	F,S	3	ECE 303 or STAT 303 or 315
<input type="checkbox"/>	ECE 465	Electrical Energy Generation Technologies	S	3	ECE 202 with a min grade of C
<input type="checkbox"/>	GEOL 120	Exploring Earth: Physical Geology, (AUCC 3A)	F,S,SS	3	
<input type="checkbox"/>	GEOL 122	Geology of Our Environment, (AUCC 3A)	F,S,SS	3	
<input type="checkbox"/>	GEOL 150	Physical Geology for Scientists and Engineers	F	4	
<input type="checkbox"/>	GEOL/CIVE 424	Modern Gas and Oil	S	3	
<input type="checkbox"/>	MECH 303	Energy Engineering	F	3	CBE 310 or ECE 341 or MECH 237 or MECH 337 or PH 361.
<input type="checkbox"/>	MECH 337	Thermodynamics	F,S	4	MATH 261 and PH 141.
<input type="checkbox"/>	MECH 463	Building Energy Systems	S	3	MECH 344.
<input type="checkbox"/>	MECH 575	Solar and Alternative Energies	F	3	MECH 337 & 342 & 344.
<input type="checkbox"/>	PH 110	Descriptive Physics, (AUCC 3A)	F,S	3	
<input type="checkbox"/>	PH 121	General Physics I, (AUCC 3A)	F,S,SS	5	MATH 125 or 155 or 157 or 160 (may be taken concurrently)
<input type="checkbox"/>	PH 141	Physics for Scientists and Engineers I, (AUCC 3A)			MATH 126 & (MATH 155 or 155, or 159 or 160)

## About the Energy Institute

The Energy Institute is a cross-campus, interdisciplinary collaboration administered by the Office of the Vice President for Research that spans all eight colleges and extends off campus to a global network of public and private partners. It serves as a convening and collaboration hub for faculty, staff, students, donors, sponsors, alumni, and other stakeholders and is underpinned by over 160 faculty involved in all aspects of energy research, education, outreach, and entrepreneurship.



## About the School of Global Environmental Sustainability

The School of Global Environmental Sustainability was established in 2008 under the direction of Professor Diana Wall. The School is now poised to take off, and to become a successful model for the modern, interdisciplinary 21st century university. The School is an “umbrella” institution that focuses the education and research capabilities of eight colleges within CSU ranging from the Warner College of Natural Resources to the College of Business. This wide range of expertise allows the School to address a comprehensive set of sustainable development issues such as food security, poverty, inequality, water management, industrial ecology, sustainable engineering and urbanization.



## For more information on the Minor in Sustainable Energy

Go to the Energy Institute’s website website: <http://www.energy.colostate.edu/p/for-csu-students> or contact our student advisor, who can help you with questions and enrollment in the minor.:

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