

- Arch140 – Intro to Energy and Environmental Management (Benton, Brager).** Thermal and lighting environments in buildings, emphasis on quantitative design techniques. SP
- Arch240 – Energy Analysis Tools for Sustainable Building Design.** Quantitative and qualitative methods for assessing energy performance of residential and commercial buildings. Students will get hands-on experience with various state-of-the-art software. SP
- ARE151/EconC171 – Int’l Economic Development (DeJanvry).** Comprehensive intro to developing-world issues and policies related to poverty, macroeconomic policy, and sustainability. F/SP
- ARE253/PubPolC253 – Int’l Economic Development Policy (DeJanvry).** Development and application of policy solutions to developing-world problems related to poverty, macroeconomic policy, and environmental sustainability. Methods of statistical, economic, and policy analysis are applied to a series of case studies. F
- BioEngC105B/ME105B – Thermodynamics and Biothermodynamics.** Course introduces basic principles of thermodynamics and their application to a variety of biological processes and systems. F
- ChemE295F / ER291-1 – Battery Technologies (Gur, Srinivasan / Kammen).** Course aims to equip students with the concepts and analytical skills necessary to assess the utility and viability of various battery technologies in the context of a growing demand for electrochemical energy storage.
- CE107 – Climate-Change Mitigation (Nazaroff).** Assessment of technological options for responding to the threat of climate change. Overview of climate science. Renewable energy, transport, storage, and transformation technologies, efficiency, sequestration. F
- CE218A – Air Quality Engineering (Harley, Nazaroff).** Quantitative overview of the characterization and control of air pollution problems. Key elements: sources and control techniques, atmospheric transport and transformation, and air quality modeling. F
- CE268E – Civil Systems and the Environment (Horvath).** Methods and tools for economic and environmental analysis. Life-cycle planning, design, costing, financing, and environmental assessment. Industrial ecology, design for environment, pollution prevention. F
- CE290 – Petroleum Capstone Design (Cooper, Patzek).** The process of discovering and evaluating an oilfield. Weekly topics include seismic survey, design, drilling, and completing a discovery well; logging, testing, delineation of the reservoir, estimation of reserves, production planning, and economic analysis. Extensive use of computer simulation.
- CE C293A/ER293A Technology and Sustainability (Horvath, Gadgil, Nazaroff).** Consequences and opportunities of technological systems (e.g. buildings, waste mgmt., etc.) for sustainability. F
- CRP C213 – Transportation & Land Use Planning (Chatman).** Course builds a conceptual and methodological framework for transportation and land use planning. First half concentrates on demand, supply, cost, and performance characteristics of transport systems, second on empirical investigations. F
- ER C100 / C200 – Energy & Society (Kammen).** Analytic tools for the study of the science, engineering, and policy questions of energy technologies, applications, and impacts. Pre-requisite to work in RAEL, and for some advanced energy courses. ER C100 or undergraduates only. Graduate students enroll in ER C200. [Now also Public Policy C184 / C284]. F
- ER151 – Politics of Energy and Environmental Policy.** Covers how existing agencies and policy makers incorporate new concerns into their tasks, and how agencies given new mandates seek to fold them into the existing institutional and policy structures.
- ER198 - Directed Group Studies for Advanced Undergraduates (Kammen).** Project course on energy and sustainability at and around UC Berkeley. F/SP

\*This list is mostly topical. Do not forget *methods* classes like risk assessment, econometrics, surveys, quantitative methods, etc. that often either support energy analysis, or use energy systems as the subject of instruction.

- ER C200 – Energy & Society (Kammen).** See ER C100 description. For graduate students only. Undergraduates enroll in ER C100.
- ER220 – Modeling for Energy and Resources.** Optimization modeling and decision analysis with an emphasis on optimization and on applications in energy, environment, and resource management.
- ER226/MSE226 – Photovoltaic Materials (Haller & Kammen).** Advanced treatment of the solid state physics, performance, market economics and regulatory policies surrounding the development, implementation, and uses of photovoltaics. F (alternate years).
- ER254 – Electric Power Systems.** Provides an understanding of the design and operation of electric power systems. Covers physics of electricity, reactive and three-phase power, circuit analysis, reliability, system planning, scheduling, institutional design and regulation, environment, and end-use efficiency.
- ER291-001 – Electric Energy Systems (Callaway).** This course deals with the physics, design and operation of the grid with an emphasis on the underlying engineering principles. F
- ER290 – Climate Change Impacts and Adaptation (Torn).** The course will emphasize the consequences of climate change and actions to minimize its impacts.
- ER291 – Design for Sustainable Communities (Gadgil).** Teams of four students each will take on practical projects, with guidance from subject experts, to help mature technical/scientific innovations into useful products or processes.
- ER291– End-Use Energy Efficiency (Sanstad).** Seminar introduction to end-use energy efficiency in its engineering, economic, and policy aspects, and some more in-depth topics. SP (alternate years).
- ER299 – Cal Climate Action Partnership Seminar (Kammen).** Project course on energy and sustainability at and around UC Berkeley. F
- ESPM102D – Resource and Environmental Policy (Romm).** Develops concepts of public policy and how cultural, legal, political, economic, and administrative processes form, execute, and modify it. SP
- ESPM129 – Biometeorology (Baldocchi).** Examines physical, biological, and chemical processes affecting transfer of momentum, energy, and material (water, CO<sub>2</sub>, trace gases) between vegetation and the atmosphere. SP
- ESPM 256 – Science, Technology and the Politics of Nature (Winickoff).** This graduate seminar will introduce the methods and theories of Science and Technology Studies (STS) in order to explore the relationship of science, technology, law and politics in the domains of environment, development, energy, and biomedicine. The course will focus some attention on the tension between technocracy and democracy in science policy. SP
- IAS 175 – The Economics of Climate Change (Auffhammer, Fisher).** Brief intro to scientific aspects. Economic models to analyze the impacts of climate change and provide and critique existing and proposed policy tools. F/SP
- LAW\_\_ – Energy and Infrastructure Project Financing.** This course will explore the key commercial, legal, economic and policy issues affecting the development and financing of energy projects, with special emphasis on practical concerns related to investments in alternative energy.
- LAW\_\_ – Science & Regulatory Policy (Doremus).** Seminar examining the role of science in regulatory decisionmaking, procedures for scientific input into the regulatory process, and mechanisms for oversight of the use of science in that process.
- LAW270.6 – Energy Regulations & the Environment (Weissman).** Examines both traditional monopoly model of electricity regulation and evolving competitive alternatives. Covers energy resource planning, pollution, rate design, efficiency, demand management, renewable energy.

- LAW272.3 – Climate Change: Law and Policy (Payne, Farber, Frank).** This course addresses the key state, national and international climate change policies, and the role of law in dealing with the classic issues of distributional justice, science, risk, uncertainty, and precaution, federalism, technology policy, and international relations.
- LAW271.6 – Science & Regulatory Policy (Doremus).** Seminar examining the role of science in regulatory decision making, procedures for scientific input into the regulatory process, and mechanisms for oversight of the use of science in that process.
- LAW247 – Energy & Infrastructure Project Finance (Marks).** This course will explore the key commercial, legal, economic and policy issues affecting the development and financing of energy projects, with special emphasis on practical concerns related to investments in alternative energy.
- LDArch103 – Energy, Fantasy, and Form (Sullivan).** This is an undergraduate studio with a central focus on climate modification for energy conservation. We will research historical precedents in order to develop new garden forms for passive green designs. F
- MBA212 – Energy & Environmental Markets (Borenstein, Bushnell, Wolfram)** Business strategy and public policy issues in energy and environmental markets. Topics include development and effect of organized spot, futures, and derivative energy markets; political economy of regulation and deregulation; climate change and environmental policies related to energy production and use; cartels, market power and competition policy; pricing of exhaustible resources; competitiveness of alternative energy sources; and transportation and storage of energy commodities. SP
- MBA294.6 – Alternative Energy Speaker Series (Isaacs).** Covers traditional energy industries, as well as how innovations in alternative energy technologies are developing in response to global warming, energy dependence, and the geopolitical impact of hydrocarbon extraction. F
- ME105 – Thermodynamics.** This course introduces the basic principles of thermodynamics which are then applied to various areas of engineering related to energy conversion and air conditioning.
- ME140 – Combustion Processes (Chen).** Fundamentals of combustion, flame structure, flame speed, flammability, ignition, stirred reaction, kinetics and nonequilibrium processes, pollutant formation. F
- ME146 – Energy Conversion Principles (Carey).** Covers the fundamental principles of energy conversion processes, followed by development of theoretical and computational tools that can be used to analyze energy conversion for both conventional and renewable energy generation processes. F
- ME256 – Advanced Combustion (Dibble, Chen)** Numerical simulations of combustion. Combustion efficiency, minimization of pollutant formation. Catalytic combustion and catalyst based pollutant removal.
- ME290H – Green Product Development: Design for Sustainability (Agogino, Beckmann).** Covers the management of innovation processes for sustainable products, from product definition to sustainable manufacturing and financial models.
- All of the Nuclear Engineering Offerings fit as energy courses. The highlighted courses may be of particular and/or general interest**
- NE39A – Issues in Nuclear Science and Engineering (Peterson).** Introduction to nuclear energy production, use, and impacts. F
- NE124 – Radioactive Waste Management (Ahn).** Nuclear waste production, management and risks. F
- NE 161 Nuclear Power Engineering (Berger/Peterson).** The science and engineering of nuclear power plants.
- NE225 – The Nuclear Fuel Cycle (Ahn).** Covers the nuclear fuel cycle with topics ranging from nuclear-fuel reprocessing to waste treatment and final disposal, emphasizing environmental impacts.

## **PP190-8/PP290-8 – Environment and Technology from the Policy and Business Perspective (Taylor).**

Introduces environmental strategies that are being used by both policy-makers and business to affect technology development and adoption today. F

### *Seminars, Colloquia, and Events*

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The **Energy and Resources Group (ERG)** holds colloquia on Wednesdays at 4-5:30 in Barrows Hall, and these are open to the public. See <http://erg.berkeley.edu/colloquium>.

The **Renewable and Appropriate Energy Laboratory (RAEL)** holds weekly lunch talks on Wednesdays, 12-1, 323 Barrows Hall. See <http://rael.berkeley.edu>.

The **University of California Energy Institute (UCEI)** holds occasional seminars on various energy topics. See <http://www.ucei.berkeley.edu>.

The **Department of Nuclear Engineering** holds weekly seminars on Monday afternoon. See <http://www.nuc.berkeley.edu/colloquiums/index.htm>.

The **Transportation Sustainability Research Center** holds biweekly seminar on New Transportation Fuels. See <http://www.its.berkeley.edu/sustainabilitycenter/>.

The **Department of Agricultural and Resource Economics (ARE)** holds seminars at noon on Wednesdays. See [http://are.berkeley.edu/courses/envres\\_seminar](http://are.berkeley.edu/courses/envres_seminar).

The **Environmental Energy Technologies Division** of the Lawrence Berkeley National Laboratory holds frequent, but irregular brown bag seminars. See <http://eetdseminars.lbl.gov>.

The **Berkeley Energy & Resources Collaborative (BERC)** holds an annual symposium highlighting energy research at Cal, and also other events throughout the year. See <http://berc.berkeley.edu>.

The **Center for Energy & Environmental Innovation (CEEI)** is a new organization on campus which will be hosting regular events. <http://ceei.berkeley.edu/>

### *Non-Course Opportunities*

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ERG manages an **internship** program where graduate students can work on a wide range of energy, natural resources, telecommunications and water resource projects at the **California Public Utilities Commission** (based in San Francisco). Support ranges from a few hours per week to 50% GRS jobs (plus tuition at >25%).

### *Degree and Certificate Offerings in Energy at UC Berkeley*

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*Full degrees in energy:*

The **Energy and Resources Group** offers MA/MS and PhD programs  
<http://erg.berkeley.edu>

*Certificates, Minors, and additional programs in energy:*

Undergraduates can earn a **Minor in Energy and Resources**.  
[http://erg.berkeley.edu/erg/info/undergraduate\\_minor.shtml](http://erg.berkeley.edu/erg/info/undergraduate_minor.shtml)

PhD students can earn **Designated Emphasis in Energy Science and Technology**.  
<http://www.mse.berkeley.edu/deest.html>

Graduate students can earn a certificate in **Engineering and Business for Sustainability**.  
<http://sustainable-engineering.berkeley.edu>

Graduate students can earn a certificate in **Energy & Environment Innovation**  
<http://ceei.berkeley.edu/p2.html>

Please send updates and corrections to:

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