

**JOINT MASTERS OF SCIENCE IN ENVIRONMENT AND RESOURCES  
PROGRAM REQUIREMENTS FOR THE ACADEMIC YEAR 2009-2010****APPLICATION AND ACCEPTANCE**

The Emmett Interdisciplinary Program in Environment and Resources (E-IPER) offers selected students enrolled in a Stanford professional degree program in the Graduate School of Business (GSB), Stanford Law School (SLS), or School of Medicine (SoM) a Joint Master of Science in Environment and Resources degree.\* Completion of the professional school and E-IPER degree requirements results in the award of the Joint MBA-MS in Environment and Resources degree, Joint JD-MS in Environment and Resources degree, or Dual MD-MS in Environment and Resources degree (the MS degree cannot be conferred independently). Applications from current Stanford business, law, and medical students are due annually in Winter quarter. Application information is updated on the E-IPER website annually in advance of Autumn quarter. Prospective GSB and SLS applicants may apply for the Joint MS simultaneous with their MBA or JD application. Instructions for doing so are incorporated in the GSB and SLS on line application systems.

(\* *Technically a Dual MD-MS degree for students in the School of Medicine. Except where indicated, all requirements referring to the Joint MS also apply to students pursuing the Dual MD-MS degree.*)

Once offered admission to the Joint MS program, students should initiate their Joint MS program plan with the University Registrar by submitting the following forms for approval to their professional school Registrar, who will then send the form to E-IPER for signature before submission to the Registrar:

- **Enrollment Agreement for Students with Multiple Programs:**

[http://registrar.stanford.edu/pdf/multiple\\_prog\\_agree.pdf](http://registrar.stanford.edu/pdf/multiple_prog_agree.pdf)

**This form addresses how your tuition will be paid.** You must submit this form if you do not want to be charged tuition for both programs concurrently.

- **Graduate Program Authorization Petition**

This form can now be submitted electronically through Axess. From the Academics panel in your Student Center, select "Petitions and Forms" from the drop down menu to submit the Grad Auth electronically.

*Note that the Registrar will assess a processing fee on the student's university bill upon submission of these forms.*

**REQUIREMENTS**

These Requirements apply to students beginning the Joint MS in AY2009-2010. They were revised and approved by E-IPER's Executive Committee in September 2009 and replace the April 2009 draft. A summary is published in the 2009-2010 Stanford Bulletin, under the School of Earth Sciences, as required by the University: <http://www.stanford.edu/dept/registrar/bulletin/5065.htm>.

**A. COURSEWORK (ALL UNITS GIVEN IN QUARTERS)**

All Joint MS students are required to complete E-IPER's two core Joint MS courses for a letter grade:

**1. Required Courses**

**a. IPER 338/OIT 338/LAW 608 (4 units, Winter): Environmental Science for Managers and Policymakers (IPER 339/OIT 339/Law 619 also fulfills the requirement)**

In this course, all joint MS students will learn the fundamental science of *ecosystems, climate and energy systems* and build policy- and decision-support models for these systems. The course is taught by a diverse team of Stanford faculty. It will be counted toward the Joint MS regardless of what course

number students register under and will not be counted as part of the 12 unit maximum from the student's professional school (see section D. Unit Accounting). *It is highly recommended that GSB students take this class in their first year and that Law students take it in their second year of law school – that is, in their first year in the Joint MS program.*

***b. IPER 290: Capstone Project in Environment and Resources (Spring 09-10; Winter 10-11)***

All students admitted for 2009-2010 are required to complete a final project that integrates their professional degree and Joint MS coursework. Students will typically take the Capstone Project in Environment and Resources course during the Winter quarter of their second year in the Joint MS program; in AY 2009-2010, the course will be offered in Spring quarter. The capstone project may derive from a previous class, internship, or independent study a student has taken and should be conducted in consultation with the student's advising team, described in Section B. The requirement may be completed as an individual project or with a team of five students maximum and will be completed and presented publicly as part of the Capstone Project in Environment and Resources course.

## **2. Course Tracks**

Each student should select one of eight Course Tracks to focus his/her Joint MS coursework. Course Tracks are organized around one broad topic (Energy; Climate & Atmosphere; Cleantech; Land Use & Agriculture; Oceans & Estuaries; Freshwater; Human and Environmental Health; and Sustainable Built Environment). Courses are included in more than one Track where appropriate. Students should select and complete a minimum of four classes within one Track, all of which must be completed for a letter grade. These courses have been approved by E-IPER faculty as appropriate for Masters-level students; however, students should check pre-requisites to ascertain the appropriateness of specific courses and add relevant pre-requisites to their Program Plan as needed (see Section C for description of this form).

Course Tracks were updated in July 2009 and are published in the Stanford Bulletin: <http://www.stanford.edu/dept/registrar/bulletin/5065.htm>. Course Tracks will be updated periodically throughout the year; the most current can be found on the E-IPER web site: <http://e-iper.stanford.edu/courses>. Students and faculty may submit suggestions to E-IPER staff for consideration (e mail Katie Phillips, program manager, at [kphill@stanford.edu](mailto:kphill@stanford.edu)).

## **3. Additional Courses**

In addition to the two required courses and a minimum of four selected from a Course Track, Joint MS students are required to complete at least four additional *graded* elective courses at the 100-level or higher, while maintaining a 'B' average. These courses may be taken from the student's selected Track, from a different Track, or from elsewhere in the University. Of the courses selected from the Course Tracks and these additional four courses, at least half (i.e. four) must be at or above the 200-level (or equivalent, as approved by the Executive Committee). Independent study courses (directed reading, independent research, or practicum units), taken within E-IPER (i.e. IPER 398, IPER 399, or IPER 270) or in the student's professional school, may count toward one course of this requirement of four additional courses. Independent study courses, in total, may count for a maximum of four units for Joint MS students and require completion and approval of an Independent Study Agreement form for E-IPER credit (available at <http://e-iper.stanford.edu/forms>).

## **4. Lecture Series**

A maximum of 3 courses (or 5 units from courses) that are identified as primarily consisting of guest lecture series may be counted toward the Joint MS. These include the Energy Seminar, the E-IPER Current Topics Seminar, the Environmental Law Workshop, most courses with Advanced or Special Topics in their title, and others listed in *Appendix iv*.

## 5. Limits on Professional School Courses

Certain professional school courses are recommended for students in those schools and should also be considered by all Joint MS students as contributions to the students' interdisciplinary program. However, to ensure the science, technology, and engineering focus of the Joint MS, it is essential that students not overload their program with courses from their professional school. A maximum of 12 units of recommended courses from a student's professional school may count toward the Joint MS. These courses may be counted in Additional Courses above. Recommended professional school courses are listed in *Appendix v*.

## 6. Exceptions

Students may petition to count courses not listed in the Tracks or identified as recommended professional school courses using the Joint MS Petition for an Exception to a Requirement Form (available at <http://e-iper.stanford.edu/forms>). This form should also be used to request other exceptions to the Requirements described here. *Students may confer with each other and with their advisors when submitting petitions.* Such an approach strengthens the petition and helps the program adapt the requirements to better meet students' needs and incorporate curriculum changes we might not have been aware of when the Tracks and requirements were approved.

## 7. Resources to identify additional courses of interest and current schedules include:

- Stanford University Bulletin (updated on line each summer): <http://www.stanford.edu/dept/registrar/bulletin/>
- Axxess – Explore Courses: <http://explorecourses.stanford.edu/CourseSearch/>
- The Earth Systems program: <http://pangea.stanford.edu/ESYS/courses/>
- The Woods Institute's Energy and Climate Course list (see additional resources listed here): <http://environment.stanford.edu/students/grad.html>
- The Environmental and Natural Resources Law and Policy Program: <http://www.law.stanford.edu/program/centers/enrlp/#courses>

*Note that outside of our own courses, E-IPER does not have any influence over course schedules. Courses may not be offered every year. The quarter, day, and time a course is offered may change from year to year and even after the quarter has started. Students must remain flexible and patient when scheduling courses outside their professional schools. "Shopping" courses – attending the first few sessions before making a firm decision to keep a course – is a common practice at Stanford. Joint MS students should take advantage of this opportunity and identify more classes than they need, check out the professor, syllabus, and other students, and adjust their schedule by adding or dropping classes as needed.*

## B. ADVISING

Joint MS students are advised by a team consisting of an E-IPER faculty member and an E-IPER PhD student, both of whom are selected for their expertise and knowledge of courses, research groups, and other topics in the Joint MS student's area of interest. The advising team assists the student in selecting courses and developing a cohesive and rigorous MS course of study and capstone project. Students are encouraged to check in with their advisors minimally once per quarter for advice in selecting classes. *The faculty advisor must sign the student's Program Proposal for the Master's Degree form (described in more detail below) and may also be asked by staff to approve any exceptions to required coursework for which the student might petition.*

E-IPER Joint MS Program Manager Katie Phillips ([kphill@stanford.edu](mailto:kphill@stanford.edu)) serves as a general student advisor, providing support to all Joint MS students on E-IPER's requirements and degree progress. Associate director Helen Doyle also advises students on their overall program plan, career goals, and advisor relationships. E-IPER faculty director Peter Vitousek and the Executive Committee provide guidance at the policy level and approve the program's degree requirements annually.

### C. FINALIZING A COURSE PLAN

By the end of their first quarter in the Joint MS program (i.e., Autumn Quarter 2009), students are required to formally submit their course plan, using the **Program Proposal for a Master's Degree** (available on the Registrar's site: <http://registrar.stanford.edu/pdf/progpropma.pdf>). **Most students submitted** a preliminary, unsigned draft of this form as part of the Joint MS application. That draft must be revised based on updated course requirements, advising feedback, and actual course offerings. Because the Program Proposal form is submitted early in a student's Joint MS career, it can only record a student's best estimate in terms of coursework and is not a binding document, but must remain on file with E-IPER. *This revised form should be discussed with and signed by the student's faculty advisor before being submitted to the E-IPER staff by the end of Autumn quarter, 2009.*

Students, their advisors, and E-IPER staff should also track degree progress using the **Joint MS Course Planning Template**, which is a working draft of each student's plan and unit accounting. This document should be shared with the student's advising team and with E-IPER staff, approximately every quarter, and should be kept updated by the student and brought to advising meetings for discussion.

### D. UNIT ACCOUNTING

Under the Academic Senate-approved Joint degree scenarios, the unit accounting for the Joint JD-MS in Environment and Resources and the Joint MBA-MS in Environment and Resources differ significantly. Students should refer to the unit accounting diagrams in **Appendices i and ii** to improve their understanding of relevant Joint Degree scenarios. The Dual MD-MS in Environment and Resources is significantly different and will be discussed with individual students.

For either the Joint MS or the Dual MS, a maximum of 12 units of professional school coursework may be applied toward the MS in Environment and Resources. As discussed under Coursework above, relevant and approved professional school courses are listed under **Appendix v**.

**i. Joint MBA-MS in Environment and Resources:** The Joint MBA-MS requires a total of 129 units: 84 exclusively toward the MBA, 29 exclusively toward the MS and 16 "shared" units, which count toward both degrees. For an approved GSB course to count toward the 12 allowable professional school units for the MS, MBA students must focus their final projects on an environmental or natural resource topic (see **Appendix v**). It is anticipated that both degrees will be completed over approximately eight academic quarters.

**ii. Joint JD-MS in Environment and Resources:** The Joint JD-MS requires 65 semester units of courses in the Law School for the JD and 45 (30 semester units) quarter units toward the MS. The equivalent of 12 quarter (8 semester) units of approved Law School courses may be "shared" with the MS, resulting in a total of 87 semester units (130.5 quarter) for the Joint Degree. See **Appendix v** for a list of approved courses. *Note: Students must enroll in these 12 shared units under their JD Plan in Axess so they will be accepted toward the JD by the ABA.* It is possible that both degrees can be completed in three academic years depending upon when a student enters the Joint degree program and upon the courses chosen. *(Subject to revision following the SLS conversion to the quarter system.)*

**iii. Dual MD-MS in Environment and Resources:** For a Dual degree, students must meet the University's minimum requirements for both the MD and MS (235 and 45 units, respectively) – no course units may be counted toward both degrees. Because the School of Medicine's requirements exceed those of the University, students pursuing the Dual degree must obtain approval from the School of Medicine

and E-IPER to ensure their **Program Plan for a Master's Degree** meets the curricular expectations of both programs. Details of the Dual degree configuration will be discussed with individual students from the School of Medicine.

#### **E. DEGREE CONFERRAL AND GRADUATION**

It is anticipated that the Joint MBA-MS program will take eight quarters to complete (two full quarters beyond the MBA) - *students should not anticipate completing the Joint MBA-MS in a total of two years*. Due to the reduction in courses required by the Law School, the Joint JD-MS can be completed in three years at the Law School, *provided the student begins coursework toward the Joint MS in his/her second year in the Law School*. The Dual MD-MS degree is likely to require an additional year of Medical School, assuming the student is pursuing the degree as part of the Medical Scholars research program. These Joint (or Dual for medical students) degrees are conferred when the requirements for both the Joint MS and the professional degree programs have been met. Joint MS student may not confer one degree before the other. A student may withdraw from the Joint MS and receive the professional degree when s/he has fulfilled the appropriate requirements. However a student may not receive the Joint MS without simultaneously receiving a professional degree – that is, there is no stand-alone MS degree.

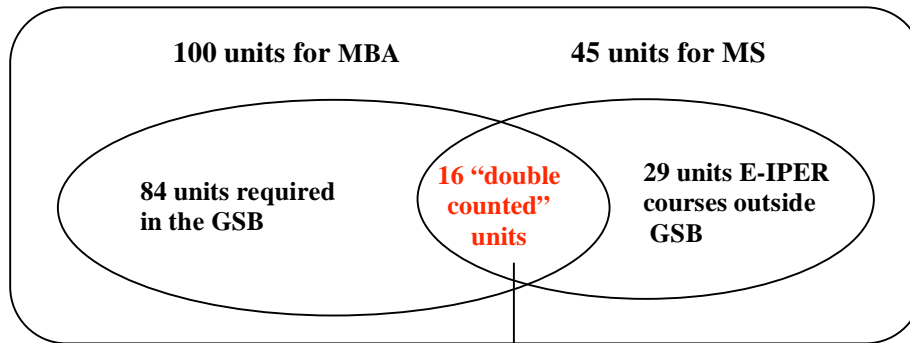
#### **F. APPENDICES**

- i. Joint MBA-MS in Environment and Resources unit diagram
- ii. Joint JD-MS in Environment and Resources unit diagrams
- iii. Course Tracks
- iv. Seminars and Lecture Series
- v. Recommended professional school courses

*Appendix i:*

**JOINT MBA-MS IN ENVIRONMENT AND RESOURCES**  
**UNIT ACCOUNTING**  
*(revised September 2009)*

**Joint MBA-MS**  
**129 units total**

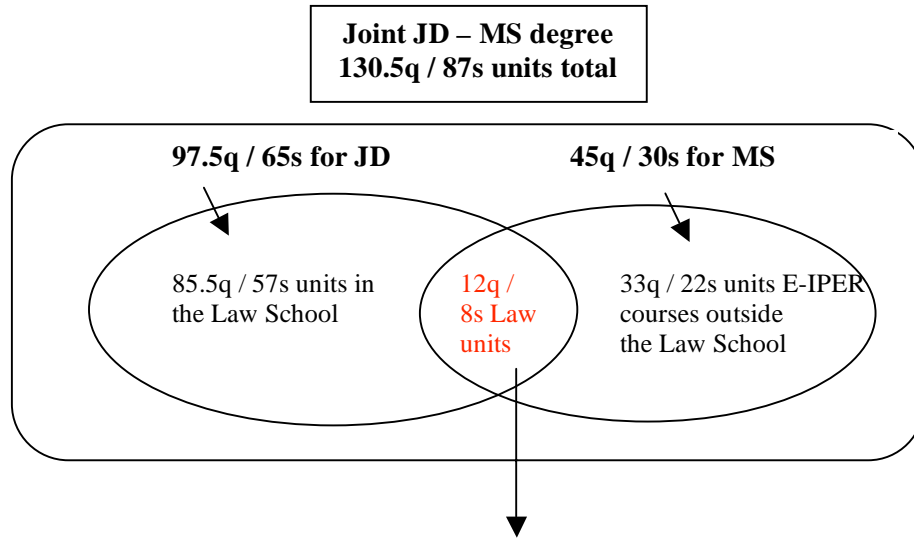


The GSB allows up to 16 out of its 100 minimum units to be taken outside of the GSB – or “across the street”. In addition, E-IPER allows up to 12 units of approved GSB courses to count toward the MS, giving students flexibility in how they attribute their units, as long as no more the 16 units are “double-counted.”

*Appendix ii:*

**JOINT JD - MS IN ENVIRONMENT AND RESOURCES  
UNIT ACCOUNTING**

*(Note: this diagram reflects the Law School's change to quarters in AY 2009-2010)*



In addition to the significant reduction in units required for the JD, the Law School and E-IPER will allow 12q/8s units of approved Law School courses to count toward both degrees. To ensure these units are recognized by the ABA, students should register for these courses with the Law School number even if they are cross-listed with other department numbers.

### **Appendix iii. COURSE TRACKS**

*(updated September 2009 - courses in italics were added since the 2009-2010 Bulletin was published)*

#### **ENERGY**

APPPHYS 219. Solid State Physics and the Energy Challenge  
CEE 173A. Energy Resources  
CEE 176A. Energy Efficient Buildings  
CEE 176B. Electric Power: Renewables and Efficiency  
CEE 236. Green Architecture  
CEE 272P. Distributed Generation and Grid Integration of Renewables  
CHEMENG 454. Synthetic Biology and Metabolic Engineering  
EARTHSYS 232. Energy Cooperation in the Western Hemisphere  
EE 293A. Fundamentals of Energy Processes  
EE 293B. Fundamentals of Energy Processes  
*ENERGY 101: Energy and the Environment*  
*ENERGY 102: Renewable Energy Sources and Greener Energy Processes*  
*ENERGY 104: Technology in the Greenhouse*  
*ENERGY 120: Fundamentals of Petroleum Engineering*  
ENERGY 226. Thermal Recovery Methods  
ENERGY 227. Enhanced Oil Recovery  
ENERGY 253. Carbon Capture and Sequestration  
ENERGY 269. Geothermal Reservoir Engineering  
MS&E 198. Applied Modeling of Energy and Environmental Markets  
MS&E 243. Energy and Environmental Policy Analysis  
MS&E 295. Energy Policy Analysis  
MS&E 491. Real-World Clean Energy Project Development  
MATSCI 302. Solar Cells  
MATSCI 316. Nanoscale Science, Engineering, and Technology  
ME 260. Fuel Cell Science and Technology  
ME 370A. Energy Systems I: Thermodynamics  
ME 370B. Energy Systems II: Modeling and Advanced Concepts  
ME 370C. Energy Systems III: Projects

#### **CLIMATE AND ATMOSPHERE**

BIO 117. Biology and Global Change  
BIO 247. Controlling Climate Change in the 21st Century  
BIO 264. Biosphere-Atmosphere Interactions  
CEE 172. Air Quality Management  
CEE 263A. Air Pollution Modeling  
CEE 263D. Air Pollution: From Urban Smog to Global Change  
CEE 278A. Air Pollution Physics and Chemistry  
CEE 278B. Atmospheric Aerosols  
CEE 278C. Indoor Air Quality  
EARTHSYS 143. Climate Change in the West: A History of the Future  
EARTHSYS 233. California Climate Change Law and Policy  
EARTHSYS 284. Climate and Agriculture  
ENERGY 253. Carbon Capture and Sequestration  
MS&E 294. Climate Policy Analysis

#### **CLEANTECH**

APPPHYS 219. Solid State Physics and the Energy Challenge  
CHEMENG 274. Environmental Microbiology I  
CHEMENG 355. Advanced Biochemical Engineering  
CHEMENG 454. Synthetic Biology and Metabolic Engineering  
CHEMENG 456. Metabolic Biochemistry of Microorganisms  
CEE 172P. Distributed Generation and Grid Integration of Renewables

CEE 176A. Energy Efficient Buildings  
CEE 176B. Electric Power: Renewables and Efficiency  
CEE 215. Goals and Methods of Sustainable Building Projects  
CEE 226. Life Cycle Assessment for Complex Systems  
CEE 275B. Process Design for Environmental Biotechnology  
ENERGY 253. Carbon Capture and Sequestration  
ENERGY 269. Geothermal Reservoir Engineering  
MS&E 264. Sustainable Product Development and Manufacturing  
MS&E 491. Real-World Clean Energy Project Development  
MATSCI 302. Solar Cells  
MATSCI 316. Nanoscale Science, Engineering, and Technology  
ME 222. Design for Sustainability  
ME 260. Fuel Cell Science and Technology

### **LAND USE AND AGRICULTURE**

BIO 101. Ecology  
BIO 117. Biology and Global Change  
BIO 121. Biogeography  
BIO 125: Ecosystems of California  
BIO 144. Conservation Biology  
BIO 206. Field Studies in Earth Systems  
BIO 216. Terrestrial Biogeochemistry  
BIO 264. Biosphere-Atmosphere Interactions  
BIO 280. Fundamentals of Sustainable Agriculture  
EARTHSYS 143. Climate Change in the West: A History of the Future  
EARTHSYS 233. California Climate Change Law and Policy  
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy  
EARTHSYS 281. Concepts of Urban Agriculture  
EARTHSYS 284. Climate and Agriculture  
EESS 155. Science of Soils  
EESS 162. Remote Sensing of Land Use and Land Cover  
EESS 256. Soil Chemistry  
URBANST 163. Land Use Control  
URBANST 165. Sustainable Urban and Regional Transportation Planning

### **OCEANS AND ESTUARIES**

BIO 274S. Hopkins Microbiology Course  
BIOHOPK 263H. Oceanic Biology  
BIOHOPK 271H. Ecological and Evolutionary Physiology  
BIOHOPK 272H. Marine Ecology  
BIOHOPK 285H. Ecology and Conservation of Kelp Forest Communities  
CEE 262D. Introduction to Physical Oceanography  
CEE 272. Coastal Contaminants  
CEE 275A. Law and Science of California Coastal Policy  
EARTHSYS 208. Coastal Wetlands  
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy  
EESS 241. Remote Sensing of the Oceans  
EESS 243. Marine Biogeochemistry  
EESS 244. Marine Ecosystem Modeling  
EESS 258. Geomicrobiology

### **FRESHWATER**

CEE 101B. Mechanics of Fluids  
CEE 169. Environmental and Water Resources Engineering Design  
CEE 177. Aquatic Chemistry and Biology  
CEE 260C. Contaminant Hydrogeology

CEE 262A. Hydrodynamics  
CEE 262B. Transport and Mixing in Surface Water Flows  
CEE 262E. Lakes and Reservoirs  
CEE 264A. Rivers, Streams, and Canals  
CEE 265C. Water Resources Management  
CEE 265D. Water and Sanitation in Developing Countries  
CEE 266A. Watersheds and Wetlands  
CEE 266B. Floods and Droughts, Dams and Aqueducts  
CEE 266D. Water Resources and Water Hazards Field Trips  
CEE 268. Groundwater Flow  
CEE 270. Movement and Fate of Organic Contaminants in Waters  
CEE 271A. Physical and Chemical Treatment Processes  
CEE 273. Aquatic Chemistry  
CEE 273A. Water Chemistry Laboratory  
CEE 275B. Process Design for Environmental Biotechnology  
EARTHSYS 143. Climate Change in the West: A History of the Future  
EARTHSYS 233. California Climate Change Law and Policy  
EARTHSYS 273. Aquaculture and the Environment: Science, History, and Policy

#### **HUMAN AND ENVIRONMENTAL HEALTH**

ANTHRO 261A. Ecology, Nature, and Society: Principles in Human Ecology  
ANTHRO 262. Indigenous Peoples and Environmental Problems  
ANTHRO 277. Environmental Change and Emerging Infectious Diseases  
ANTHRO 362. Conservation and Evolutionary Ecology  
BIO 102. Demography: Health, Development, Environment  
CEE 265C. Water Resources Management  
CEE 265D. Water and Sanitation in Developing Countries  
CEE 274D. Pathogens and Disinfection  
CEE 274E. Pathogens in the Environment  
CEE 276. Introduction to Human Exposure Analysis  
CEE 276E. Environmental Toxicants  
CEE 278C. Indoor Air Quality  
EARTHSYS 165. Promoting Behavior Change  
EARTHSYS 224. Environmental Justice: Local, National, and International Dimensions

#### **SUSTAINABLE BUILT ENVIRONMENT**

CEE 100. Managing Sustainable Building Projects  
CEE 136. Green Architecture  
CEE 176A. Energy Efficient Buildings  
CEE 176B. Electric Power: Renewables and Efficiency  
CEE 177P. Sustainability in Theory and Practice  
CEE 215. Goals and Methods of Sustainable Building Projects  
CEE 224A. Sustainable Development Studio  
CEE 226. Life Cycle Assessment for Complex Systems  
CEE 248. Real Estate Development  
CEE 248G. Certifying Green Buildings  
CEE 265A. Sustainable Water Resources Development  
CEE 272P. Distributed Generation and Grid Integration of Renewables  
CEE 341P. Politics and Infrastructure Investment  
URBANST 163. Land Use Control  
URBANST 165. Sustainable Urban and Regional Transportation Planning

***Appendix iv. Seminars and Lecture Series***

*A maximum of three courses or five units may be counted toward the Joint MS. This list is not exhaustive.*

CEE 301. The Energy Seminar (ENERGY 301)  
IPER 225. E-IPER Current Topics Seminar (formerly IPER Lunch)  
IPER 310. Environmental Forum Seminar  
LAW 432. Environment and Energy Workshop  
GSBGEN 547. Business and Environmental Issues  
MS&E 453B. Energy Decision-Making Seminar  
MS&E 453C. Environmental Decision-Making Seminar

***Appendix v. Recommended Professional School Courses***

*These courses may count exclusively for the Joint MS or may be double counted for the Joint MBA-MS and Joint JD-MS. A maximum of 12 units from the student's professional school may count toward the Joint MS in either configuration.*

**Stanford Law School**

LAWGEN 206: Thinking Like a Lawyer  
LAW 437: Water Law  
LAW 338: Land Use  
LAW 599: Climate Change Workshop  
LAW 435: Climate Change Law and Policy: From California to the Federal Government  
LAW 603: Environmental Law and Policy  
LAW 622. Environmental Law Clinic  
LAW 623. Advanced Environmental Law Clinic

**Graduate School of Business**

GSBGEN 339. Environmental Entrepreneurship  
OIT 333, OIT 334. Entrepreneurial Design for Extreme Affordability  
MKTG 551. Initiating, Sustaining, and Monetizing Green Marketing

*Courses with an asterisk (\*) will only be counted if the student focuses his/her final project on an environmental issue. A maximum of one \* course will be counted toward the Joint MS.*

\*S373. Strategic Thinking in Action - in Business and Beyond  
\*STRAMGT 368. Strategic Management of Nonprofits  
\*STRAMGT 378. Strategic Leadership for Nonprofits  
\*STRAMGT 369. Social Entrepreneurship  
\*STRAMGT 353. Entrepreneurship: Formation of New Ventures  
\*STRAMGT 356. Evaluating Entrepreneurial Opportunities