

Industrial Ecology (IE) Graduate Academic Certificate (GAC) Students:

We welcome you to participate in the IE research and education opportunities at UC Davis. To enroll in the IE GAC you MUST be a University of California Davis Masters or Doctoral level graduate. You MUST apply to the by the 25th day of instruction to enroll in the following term.

Successful applicants will be notified prior to the end of the quarter in which they submitted their application of their acceptance to the GAC. Applicants to the GAC must complete the following 3 step process. Failure to complete any one of these steps may result in your expulsion from the program. After admission to the GAC, please complete steps 4 and 5 below.

Your written application (Step 1), the Preliminary Program of Study Form (see Step 2), and the GAC Application Form (see Step 3) must be sent to Lauren Worrell lkworrell@UCDAVIS.EDU by the 25th day of instruction to enroll in the following term.

Step 1: Complete the written application (see page 1 of this packet) and review your course selection (also called the Preliminary Program of Study) and application with your faculty mentor.

Note: your faculty mentor can be the chair or a member of your Masters or PhD committee, or a member of the UC Davis Industrial Ecology Affiliated Faculty (see the IE website for a full listing of current affiliated faculty; www.ie.ucdavis.edu).

Step 2: Complete the Preliminary Program of Study Form for the Industrial Ecology Graduate Academic Certificate (see page 2 of this packet; check the 'Preliminary' box).

Step 3: Complete the **Graduate Academic Certificate (GAC) Application Form** (see page 3 of this packet). Note: Lauren Worrell will obtain the Graduate Adviser Signature and the GSC Chair signature upon approval of your application.

AFTER ADMISSION to the Industrial Ecology GAC, you MUST complete the next steps:

Step 4: Student completion of annual progress reports: One report must be submitted to Lauren Worrell lkworrell@UCDAVIS.EDU for each year the student is enrolled in the IE GAC (see page 4 of this packet).

Step 5: When all coursework and research presentation requirements are fulfilled, complete the 'Final' Program of Study for the Industrial Ecology Graduate Academic Certificate (check the 'Final' box) and the **Graduate Academic Certificate Report Form-Final Verification** (see page 5 of this packet). Attach confirmation of your research requirement to your 'Final' Program of Study. Your 'Final' Program of Study for the Industrial Ecology Graduate Academic Certificate must be submitted with your GAC Report Form – Final Verification to Lauren Worrell lkworrell@UCDAVIS.EDU for the GAC to be processed and added to your official record.

Regarding your presentation of research: If you choose to present at an UC Davis IE team meeting, please have the faculty member running the meeting send an email of confirmation to lkworrell@ucdavis.edu, or write a short memo for research requirement confirmation. If you choose to present your research at a workshop or a conference at UC Davis or elsewhere, the program documents that lists your name and your presentation title must be submitted with the 'Final' Program of Study.

References and Links:

Graduate Academic Studies Office: Please check the website for updated information about the persons to contact and forms to use to apply for the Graduate Academic Certificate program:

<https://gradstudies.ucdavis.edu/programs/graduate-academic-certificates>

Written Application

To be considered complete, the application must include all sections noted below prior to the deadline. The application deadline is the 25th day of instruction to be considered for enrollment in the following term. Please see <http://registrar.ucdavis.edu/calendar/quarter.cfm> for exact date.

1. Personal Information:

Name: _____ Student ID: _____

Current Major: _____ Degree Objective (Ms/PhD): _____

2. Personal Statement:

State your intent to gain expertise in industrial ecology, with an emphasis on life cycle analysis and material flow analysis, green engineering, sustainable manufacturing, or design to enhance sustainable use (and reuse) of natural resources.

500 word maximum; attach to your application a typed, one-page document formatted as follows: single spaced, 1-inch margins, font size: 12, font: Times New Roman

3. Program of Study Requirements:

You must select courses from the designated course listing (see **Appendices A**), and identify a faculty mentor with whom you will clearly define the linkage of the GAC with your academic and or professional goals, and related research.

Note: You are required to complete a minimum of 14 units (including at least 12 graduate-level units) selected from the groups of courses listed in Appendices A.

To complete this section of the application, please submit a Preliminary Program of Study (see page 3) to indicate the courses you have selected for the IE GAC, as well as how you propose you will complete the presentation of research requirement.

Faculty Mentor (print): _____

I, _____ (faculty mentor), have reviewed the students written application and hereby accept the responsibility as faculty mentor for _____ (student applicant). We discussed and clearly defined the linkage of the GAC and selected GAC courses with the student's academic and/or professional goals, and related research. I reviewed and am aware of the IE GAC student advising and monitoring program (provided in Appendices B).

Faculty advisor (signed)

Date

Program of Study for the Industrial Ecology Graduate Academic Certificate

Department of Civil & Environmental Engineering

Name		Student ID:	
BS : School		Major:	Date:
MS : School		Major:	Date:

Current Degree Major & Program Code	
Current Degree Objective (MS or PhD):	
Check One: <input type="checkbox"/> Preliminary	<input type="checkbox"/> Final

Course Requirements

Course Title	Prefix	Number	Core/ Elec.**	Term & Year	Units		Grade
					UG	G	
Total					0	0	

*NOTE: You are required to complete a minimum of 14 units (including at least 12 graduate-level units) selected from the groups of courses listed in the IEGAC application packet. **Indicate if this course counts towards your core or elective courses for your degree program.

Presentation of Research Requirement (Please attach additional documentation as applicable)

Date of Presentation:	
Venue/Audience:	
Description of Presentation:	

*Verification of Research Requirement Completion is necessary when submitting your Final Program of Study.

UC DAVIS

OFFICE OF GRADUATE STUDIES

250 Mraz Hall • One Shields Ave.
Davis, CA 95616
(530) 752-0450
ucdavis.gradstudies.edu

Graduate Academic Certificate (GAC) Application

Name: UC Davis Student ID #:
last name first name middle name

Current E-mail:

Graduate Program:

GAC:

STUDENT CERTIFICATION

I understand that I must remain in good academic standing and meet all the requirements of the Graduate Academic Certificate as well as those of my major program.

Student Signature: _____ Date: _____

Printed Name: _____

GRADUATE PROGRAM ADVISER CERTIFICATION

I certify that the above-named student is in good academic standing (as defined in the *Graduate Advisers Handbook*) and eligible to participate in the graduate academic certificate noted on this form.

Graduate Adviser Signature: _____ Date: _____

Printed Name: _____

GAC CHAIR CERTIFICATION

I certify that the above-named student was admitted to the Graduate Academic Certificate on _____ (date)

GAC Chair Signature: _____ Date: _____

Printed Name: _____

GRADUATE STUDIES APPROVAL

Associate Dean for Students Signature: _____ Date: _____



Industrial Ecology (IE)
 Graduate Academic Certificate (GAC)
 Graduate Student Advising and Progress Report

Student Name: _____

Student ID: _____

Major & Program Code: _____

Degree Objective: _____

Name of Faculty Mentor (for IE GAC): _____

1. Graduate Academic Certificate Requirements that remain to be fulfilled:

2. Expected completion date (of IE GAC): _____

3. Check the progress that the student has made over the past academic year:

Satisfactory

Marginal

Unsatisfactory

If you indicated that the student is making Marginal or Unsatisfactory progress, please specify why and explain, either here or in an attached memorandum, the precise conditions, including deadlines, the student must fulfill to achieve a satisfactory report and return to good academic standing:

Student Signature: _____

Date: _____

Faculty Mentor Signature: _____

Date: _____

IE GAC Executive Committee Signature: _____

Date: _____

UC DAVIS**OFFICE OF GRADUATE STUDIES**

250 Mink Hall • One Shields Ave.
Davis, CA 95616
(530) 752-0650
ucdavis.gradstudies.edu

Graduate Academic Certificate (GAC) Report Form – Final Verification**TO THE STUDENT**

This form must be filed with the Graduate Studies office when all the graduate academic certificate requirements have been met. It is your responsibility to assure that the needed GAC chair signature is acquired and that the form is sent to Graduate Studies. Your name and graduate academic certificate cannot be added to a degree list without this verification.

Name: _____
last name first name middle name

UC Davis Student ID #: _____

Graduate Program: _____

GAC: _____

GAC CHAIR CERTIFICATION

I certify that the above-named student has satisfied all requirements for the stated Graduate Academic Certificate and that I have the authority to make this certification.

GAC Chair Signature: _____ Date: _____

GRADUATE STUDIES APPROVAL

Associate Dean for Students Signature: _____ Date: _____

Appendices A

Each of the courses listed is an existing course and a current course description can be found on the UC Davis website.

Note: In some cases, courses that are not listed on this list will be considered towards a student's completion of the requirements for the IE GAC. These courses will be considered on a case-by-case basis only, by student petition. If you are interested in petitioning for a class, please contact Lauren Worrell. (Case-by-case means that because one student can use a course to meet their IE GAC requirements does not necessarily mean that another student can use the same course for their IE GAC requirements. The petitioned courses are considered in light of the students overall IE GAC program and related research goals).

Industrial Ecology Core Course (required)

ECI 244 Life Cycle Assessment for Sustainable Engineering (4)

- Life cycle assessment methodology is taught emphasizing applications to infrastructure and energy systems. Life cycle design, life cycle cost methods, other tools from industrial ecology, and links to policy are covered.

Systems Analysis and Green Engineering (minimum of two courses from this section are required)

CRD 244 Political Ecology of Community Development (4)

- Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries.

EBS 216 Energy Systems (4)

- Theory and application of energy systems. System analysis including input-output analysis, energy balances, thermodynamic availability, economics, environmental considerations. Energy conversion systems and devices including cogeneration, heat pump, fuel cell, hydroelectric, wind, photovoltaic, and biomass conversion processes.

ECI 123 Urban Systems and Sustainability (4)

- Systems-level assessment approach is taught emphasizing sustainability of urban systems based on interaction with natural environments. Definition, metrics, and system analyses of urban sustainability such as urban metabolism and material flow and analysis; enabling technology, policies, legislation; measures and modification of ecological footprints are covered.

ECM 281 Green Engineering: Theory and Practice (3)

- Methods of evaluating alternative technologies, processes, materials, chemicals, and/or products relative to pollution, waste, toxic substance use, and sustainability. Topics include environmental regulations, recycling, life-cycle assessment, economic analysis, design for the environment, green chemistry and toxicology are covered.

ENG 250 Technology Management (3)

- Management of the engineering and technology activity is taught emphasizing functions of design,

planning, production, marketing, sales, and maintenance. Technological product life cycle, research and development activity, project planning and organization, and manufacturing issues are covered.

MAE 218 Advanced Energy Systems (4)

- Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric powerplant.

MAE 298 Sustainable Manufacturing (4)

- Sustainability trends in manufacturing are taught. Energy and material efficiency of manufacturing strategies and life cycle engineering, and tools to measure and assess sustainability in different settings are covered.

LDA 201 Theory and Philosophy of the Built Environment (4)

- Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences.

LDA 215 Ecologies of Infrastructure (4)

- Focus on design practices and theory associated with ecological and sustainable conceptions of infrastructure, including networked infrastructure, region/bioregion/regionalization, ecological engineering, reconciliation ecology, novel ecosystems, and theory/articulation of landscape change.

SPH 262 Principles of Environmental Health Science (3)

- Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public.

C2. Elective Courses (courses from this section may be taken to satisfy the unit requirement)

ABT 182 Environmental Analysis using GIS (4)

- Prerequisites required. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS.

ARE 121 Economics of Agricultural Sustainability (4)

- Prerequisites required. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues.

ARE 275 Economic Analysis of Resource and Environmental Policies (4)

- Prerequisites required. Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models.

Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain.

EBS 265 Design and Analysis of Engineering Experiments (5)

- Prerequisites required. Simple linear, multiple, and polynomial regression, correlation, residuals, model selection, one-way ANOVA, fixed and random effect models, sample size, multiple comparisons, randomized block, repeated measures, and Latin square designs, factorial experiments, nested design and subsampling, split-plot design, statistical software packages.

EBS 270 Modeling and Analysis of Biological and Physical Systems (3)

- Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within biological and agricultural engineering. Offered in alternate years.

ECI 155 Water Resources Engineering and planning (4)

- Prerequisites required. Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems.

ECI 161 Transportation System Operations (4)

- Principles of transportation system operations are taught emphasizing traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways.

ECI 267 Water Resources Management (3)

- Prerequisites required. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management.

LDA 140-Green Building, Design, and Materials (4)

- Prerequisites required. Restricted to Landscape Architecture majors only. Sustainable design and construction techniques at site and building scales. Emphasizes real-world case studies, analysis of opportunities for actual sites, and application of LEED and Sustainable Sites green rating systems.

Appendices B

IE GAC student advising and monitoring program includes:

1. Student completion and faculty mentor review of completed coursework.
2. Student completion of annual progress reports (one report must be submitted for each year the student is enrolled in the IE GAC).
3. Faculty mentor review and advisement of student's research that must be presented at an UC Davis IE team meeting or a workshop or a conference. If the student chooses to present his/her research at a workshop or a conference at UC Davis or elsewhere, documentation including the student's name and presentation title must be submitted with the final program of study.