



Global Integrated Systems Engineering

A certificate program developed in collaboration with Boeing and the College of Engineering and the Foster School of Business, University of Washington.

www.outreach.washington.edu/ext/certificates/gse/gse_gen.asp

Prof. Richard Storch, Chair, Industrial &
Systems Engineering, UW

Prof. Christina Mastrangelo, Industrial &
Systems Engineering, UW

James Salmon, Deputy Chief Engineer
Product Development
Boeing Commercial Airplanes



A Graduate Certificate Program

Global Perspective





Vision

- ❖ While certain basics of engineering will not change, the global economy and the way engineers work is rapidly changing. There is a growing need for inter-disciplinary, system-based approaches, and engineers who are not only broadly educated but who also see themselves as global citizens.
- ❖ We believe that engineers need to become systems thinkers by combining their technical discipline with **systems engineering** skills while understanding the **business aspects** of successful product development and the **global environment** of engineering and business.
- ❖ These engineers must be able to operate effectively in **virtual, multi-cultural teams**.



GISE Certificate Program Objectives

- ❖ To produce a new generation of complex systems thinkers who can excel in a global environment.
- ❖ To enable students to operate effectively in culturally diverse environments.
- ❖ To help students develop additional skills in systems engineering, global project management and finance/economics.
- ❖ To provide an opportunity to practice these skills on a real-world problem through a virtual team-based design experience.



Features

- ❖ Integrated lectures: topics by different faculty will be taught in one session providing linkages across topics and additional perspectives.
- ❖ Seminar series: 'Developing the Global Perspective' focuses on developing international knowledge and cross-cultural communication skills.
- ❖ Industry Involvement: professionals provide industrial perspective to the program.
- ❖ Transferability: the credits may be transferable into existing UW engineering programs.



Additional Features

- ❖ **Timeline:** The 15-credit, graduate-level certificate program is completed in one academic year.
- ❖ **Cost:** The program is charged at the nominal UWEO rates.
- ❖ **Access:** It is designed expressly for professionals and full-time graduate students with a distance learning capability and near real-time video streaming.
- ❖ **Practical:** The program of study is hands-on with group projects and case studies in the integrated lecture segment and real-world system design in the project segment.



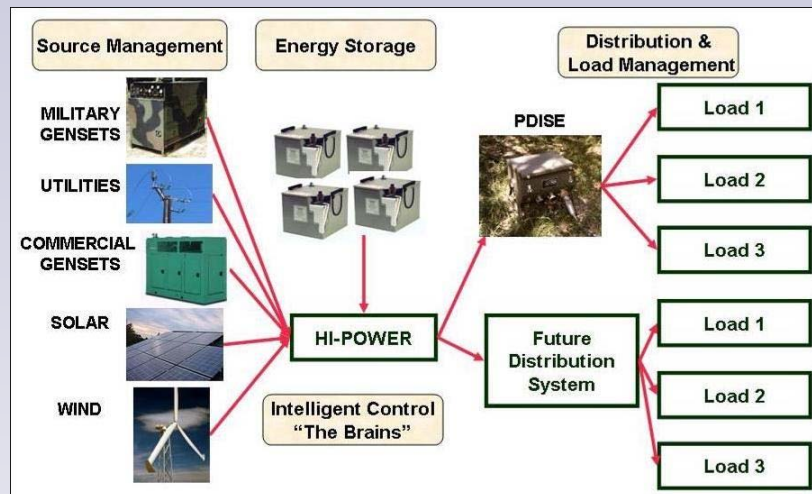
Course Structure

- ❖ 15-credit hour program in one academic year.
- ❖ Attend a 2-day on-campus team-building session Sept. 25-26, 2009, before the class begins.
- ❖ Classes meet once per week on Thursday from 3:30-8:00pm through the fall and winter quarters (late Sept – mid March). Virtual delivery available.



Course Structure (2)

- ❖ Attend a 2-day project kick-off session Apr. 1-2, 2010.
- ❖ Complete a multicultural team-based systems/business design experience in the Spring quarter (Mar – Jun), with Thursday evening sessions for project review and technical advising.
- ❖ Final project presentations on June 3, 2010.



Hybrid Power Management System



Who Should Attend

- ❖ Technical and management personnel whose career growth requires that they become more aware of the global business environment and how to be competitive.
- ❖ Practicing engineers who are interested in strengthening their technical and/or management knowledge from a systems perspective.
- ❖ Graduate students studying engineering or a related discipline, who are interested in broadening their understanding of global integrated systems engineering.
- ❖ Those who have earned a B.S in engineering or related discipline, seeking a higher level of technical competence for careers as professional systems engineers.





Why Employers Should Support Attendance

- ❖ To obtain competitive advantage.
- ❖ Increase employees awareness and skills in Systems Engineering.
- ❖ Give employees a fundamental understanding of the business process that drives engineering and how engineering drives the business.
- ❖ Employees learn to function more effectively in a multi-cultural team based project.
- ❖ Employees gain education and experience in a time compressed schedule outside of the current employment environment; they are able to gain a system and organizational perspective that usually requires years of experience.



Why Employees Should Attend

- ❖ To develop skills and experience that enhance my capabilities in comparison to other employees.
- ❖ To expand my knowledge, insight and career potential.
- ❖ Enable entering management at a higher level with an ability to interact effectively with other areas of the organization.



Autumn and Winter Quarters

- ❖ Focuses on integrated lectures in systems engineering, project management, finance and economics, and the global perspective seminar series.
- ❖ 10 credits; 5 credits per quarter.
- ❖ Schedule:
 - Two-day team building session (September 25-26, 2009).
 - Once-weekly class sessions on Thursday from 3:30-8:00 PM.



Integrated Lecture Topics

❖ **Systems Engineering**

- Top-down problem solving
- Decision analysis
- Systems engineering methodologies
- Systems analysis
- Requirements analysis
- Functional modeling
- Model-based SE

❖ **Project Management**

- Project initiation and selection
- Project planning and scheduling
- Spreadsheet models and tools
- Risk management
- Cash flows and costs
- Critical chain
- Monitoring and control

❖ **Economics/Finance**

- Time value of money
- NPV and IRR
- Pricing
- Sources of risk
- Elements of cost
- Risk-adjusted discount rates
- Competitive business environment
- Business profitability and margins



Spring Quarter

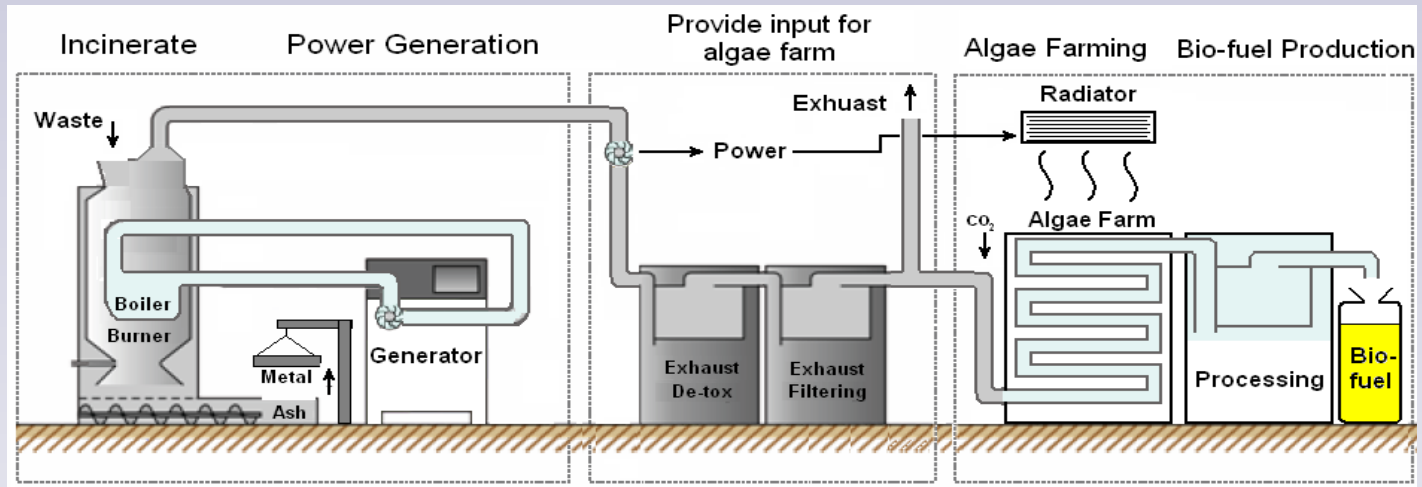
- ❖ Team-based system design project.
- ❖ 5 credits.
- ❖ Schedule:
 - Two-day project initiation session (April 1-2, 2010).
 - Thursday evening sessions for project review and technical advising.
 - Final project presentations June 3, 2010.



Team-Based Design Project

- ❖ Large-scale system.
- ❖ Apply knowledge from coursework to complete analysis and design.
- ❖ Evaluation panel comprised of practitioners, academics, and client representatives provides feedback at review sessions.
- ❖ Industry advisors available to provide extensive application and technical advice.

Schematic of waste algae hybrid energy system





Previous Projects

- ❖ Development of a communications and surveillance system with voice, data, and video capability to assess physical infrastructures impacted by a natural or manmade disaster.
- ❖ Development of a new business opportunity in the air freight industry based around the concept of point-to-point subscription-based air logistics.
- ❖ Development of a reliable, cost-effective power generation system that is scalable in production, relatively simple to deploy, and utilizes renewable energy to meet third-world needs.



Student Experience



- ❖ *“I appreciated that the faculty were accessible knowledgeable, committed, and integrated. The single most important thing I noticed was that most of the time the faculty attended each other's lectures. This was huge, and was evidence of this commitment and integration. The lectures were well planned, relevant, and enjoyable. I truly liked all the faculty and enjoyed learning from them.”*
- ❖ *“The faculty was very knowledgeable about the subject matter and were available to help students with their daily course related needs.”*
- ❖ *“I rated the course "Excellent" because I personally learned a great deal. The course was not exactly what I expected, but it was exactly what I needed.”*



Employer Experience



- ❖ *“The systems approach is being used on a daily basis in the advanced structures area in Boeing Research and Technology.” Dave Banks, The Boeing Company*



- ❖ *“The ability of these students to appreciate the global business impact of their multi-disciplinary analyses is demonstrated almost daily as they evaluate and propose work assignments.” Leroy Hanneman, Enterprise Skill Management Leader for Systems Engineering, The Boeing Company*



- ❖ *“GISE provided the training necessary to drive projects so that they are no longer focused on single stages of life cycle or within a single organization.” Scott Occhiuto, Lead Systems Engineer, Boeing Commercial Airplane Company*



Program Prerequisites

- ❖ B.S. in engineering or related discipline.
- ❖ Completion of an undergraduate-level course in probability and statistics or equivalent.



Graduate Credit

- ❖ It is not required to use credits towards a graduate degree.
- ❖ To apply credit towards a degree, the student must have graduate status prior to enrollment in program.
 - Can be matriculated or graduate non-matriculated (GNM) status.
- ❖ Contact the advising office of the graduate program in which you are interested. Some departments may not accept all 15 credits.
- ❖ A limited number of current graduate students may participate as part of their regular course load.
- ❖ Credits may be applied to the UW Professional Masters Program in Industrial and Systems Engineering.



Certificate Application Process

- ❖ Print application form from web site
- ❖ Provide four copies of supporting materials:
 - Unofficial transcripts of each college attended
 - Letter of application:
 - A typed (250-word maximum) letter describing relevant work and volunteer experience, knowledge of the field, and how the program will help meet professional goals.
 - Résumé
 - TOEFL scores (international only)
- ❖ \$50 application fee
- ❖ Application deadline: May 15
- ❖ Separate GNM application to Graduate Admissions – if applicable



Fees and Tuition

- ❖ Program tuition:
 - \$695/credit or \$3,475 per quarter.
- ❖ Total cost is \$10,425
- ❖ Additional fees include:
 - One-time application fee: \$50
 - Quarterly registration fee: \$35
 - Textbooks



Additional Information

- ❖ General inquires: UW Extension
 - 206-685-8936; 800-543-2320
 - certificate@extn.washington.edu

- ❖ Graduate credit inquiries:
 - Industrial & Systems Engineering:
ieadvise@u.washington.edu
 - Aeronautics and Astronautics:
wanda@aa.washington.edu
 - Mechanical Engineering:
meadvise@u.washington.edu