Contact: Diana Gonzalez

REQUEST FOR A NEW PROGRAM AT IOWA STATE UNIVERSITY: MASTER OF ENGINEERING PROGRAM IN ENERGY SYSTEMS ENGINEERING

Action Requested: Consider approval of the request by Iowa State University to establish a new Master of Engineering Program in Energy Systems Engineering in the College of Engineering.

Executive Summary: The proposed program will offer new opportunities for students in the field of advanced data analysis. This proposal was reviewed by the Board Office and the Council of Provosts and is recommended for approval. No concerns were raised when it was presented to the Iowa Coordinating Council for Post-High School Education. The proposed program addresses the Board of Regents Strategic Plan priorities to "provide educational excellence and impact as well as economic development and vitality" and Goal #8 – "Iowa's public universities and special schools shall be increasingly efficient and productive."

Background:

- Description of program. The proposed online, non-thesis, program will provide a foundation in Energy Systems Engineering and Analysis and Energy Economics and Policy. Students will take additional courses in a variety of energy systems. Students will be required to take at least three elective courses in one focus area – biorenewables, wind, nuclear, power generation and distribution, building energy and energy efficiency, or thermal science. The two required courses will be offered online as will more than half of the elective courses.

  The academic objective of the proposed program is to prepare students to design, evaluate, build, and manage complex energy systems. The program will prepare professionals to use methodologies for physical and economic assessment of current and future energy needs, and to apply them in industry, research, and education.

- Relationship to existing programs at ISU. The proposed program will provide College-wide, integrated coursework with a focus on new and evolving energy systems engineering technology. New and revised courses will address the growing need for education and understanding of energy systems. These courses will form the framework of an interdepartmental effort to enhance student knowledge of energy systems engineering and its application to business, industry, and the individual.

- Need for proposed program. The proposed program is designed as an interdepartmental program to address the challenge of providing sustainable energy for a growing world population. Widely reported warnings have emphasized the need to develop new sources of energy, while preventing or reversing the degradation of the environment.[1] Energy systems are pervasive, affecting almost all aspects of society. The increasing complexity of these systems, together with increasing environmental constraints, requires practicing professionals who have knowledge, skills, and abilities specific to energy system design, evaluation, construction, and management.

[1] National Academy of Engineering, 2008. Grand Challenges for Engineering. http://www.engineeringchallenges.org/File.aspx?id=11574, accessed 9/02/2011, pg.2

- Duplication. The proposed program does not exist at the University of Iowa, the University of Northern Iowa, or any other postsecondary institution in the state. The proposed program will emphasize a wide and diverse integration of knowledge across all engineering disciplines.

- Student demand. Practicing professionals are increasingly engaged in energy systems engineering. There is an unmet need for education and training in this area. There have been numerous inquiries from potential and existing graduate students about energy related coursework. Potential students are enrolled in many other programs in the College. The proposed program will provide a focus for graduate engineering students as well as practicing professionals interested in energy systems.

- Unique features. The proposed program will build on and complement the unique strengths of the University and the College. The College of Engineering currently has 226 tenured/tenure track faculty; additional faculty are projected for the college. The College has many significant energy research programs and a variety of energy-related courses at both the graduate and undergraduate levels. The College also has significant experience in providing online programs; currently it offers nine graduate programs and 13 graduate certificates online.

- Resources. Faculty from all college departments will participate in the program; they will be involved in the delivery of courses and serve as advisors to students. The Engineering-LAS Online Learning unit has the expertise and capacity to offer the proposed program online. Oversight of the proposed program will be provided by a supervisory committee with support from the Department of Mechanical Engineering. Most of the courses are currently being offered to satisfy discipline-specific needs in the other college departments. The proposed program will focus these courses into a single program.

  A Director of Graduate Education for the proposed program will direct the students' admission and program of study. A supervisory committee will oversee the curriculum. Facilities will include existing classroom for on-campus course delivery that are also used for synchronous and asynchronous online delivery. No specialized equipment will be required. Existing equipment for online delivery will be used.

- Cost. The University projects that the cost for the proposed program will be $50,000 per year. A Department of Mechanical Engineering reallocation of $20,000 will provide support staff time; a College reallocation of $30,000 will provide support staff time, marketing, and advising. The engineering differential student tuition is projected to be $592/student.

- Projected enrollment. The projected enrollment is 10 students in Year 1, increasing to 50 students by Year 7. Industry professionals seeking advanced knowledge of the new and emerging technologies in energy systems engineering will be the primary source of students. Graduate engineering students from Iowa and elsewhere who want to pursue additional education in energy systems engineering will also be a source.

- Workforce Need/Demand. The market demand for the proposed program, as well as energy-related credit and non-credit courses, is expected to grow based on anecdotal evidence from student demand and from U.S. Bureau of Labor and Statistics (BLS) projections. Energy-related jobs are not categorized separately by BLS; they are embedded in a number of industry sectors. Growth in demand for energy-related courses and degrees is expected to parallel growth of the following sectors – engineering; management, scientific, and technical consulting; utilities; power plant operators, distributors, and dispatchers; green construction; and wind energy.

  In 2011, engineers held approximately 1.6 million jobs; BLS projects employment to grow by 7-13% between 2008 and 2018. The management, scientific, and technical consulting services industry had about 1.0 million jobs and is expected to be one of the fastest growing of all industry sectors during the decade, growing by 83%.

  The utility sector included more than 500,000 jobs in 2011. The sector is expected to decline, but job openings are expected due to the large number of projected retirements. Power plant operators, distributors, and dispatchers held about 50,000 jobs. This sector is not expected to grow, but job openings are expected to be excellent also due to projected retirements.

  BLS data on green jobs show employment of more than 1.9 million in 2011. The U.S. green Building Council and Booz Allen Hamilton estimate that this sector supported more than 2.4 million jobs in the past decade and expect this to rise to approximately 3.3 million jobs by 2013. The American Wind Energy Association estimate that there are currently 85,000 jobs in the wind power industry and related fields. Growth estimates vary, depending in part on the projected availability of the production tax credit. Additional jobs, and potential demand for the proposed degree exist in other market, including bioenergy, solar power, hydropower, and geothermal energy.

  Iowa State University received letters of support for the proposed program from the Iowa Area Development Group, the Iowa Economic Development Authority, KJWW Engineering Consultants, and the Renewable Energy Group. The latter suggested an opportunity for an internship as well as scholarships.

- Accreditation for proposed program. The proposed program will not apply for accreditation.

- Link to institutional strategic plan. The College of Engineering strategic plan focuses on grand challenges and builds on its core competencies, including energy related areas and new curricula. ISU has embraced this concept; elements of the grand challenges are integral in the University's 2010-2015 Strategic Plan. A common theme in the grand challenges and ISU's strategic plan is energy and how renewable and sustainable energy systems are critical for the future of our country. The proposed program will help the University and College meet its strategic objectives.

  To address the energy challenges of the future, it is necessary to educate students in the area of energy and energy systems. The State of Iowa approached ISU with a request to develop educational content in energy and energy systems. ISU submitted a proposal to the Iowa Office of Energy Independence (OEI) which was subsequently funded. Part of the project is to develop a graduate program in energy systems to educate Iowans and others in this area. (See Appendix A for a copy of the OEI contract.)

The Board of Regents, ISU, and the College of Engineering all have a strategic goal of increasing access to education through distance education. The proposed program will be available online; it can be completed online if the student chooses courses appropriately. It complements the nine online graduate degree programs currently offered by the College of Engineering.

- Date of implementation. The proposed program will become effective upon approval by the Board of Regents and will be included in the next General Catalog of the university. New students will be admitted for the entering class of Fall 2014.