

# COMMISSION FOR HIGHER EDUCATION

Friday, December 9, 2011

## DECISION ITEM A-2:

### Master of Science in Chemical Engineering To Be Offered by Purdue University-West Lafayette via Distance Education Technology to the Crane Naval Surface Warfare Center in Crane, Indiana

#### Staff Recommendation

That the Commission for Higher Education approve the Master of Science (M.S.) in Chemical Engineering to be offered by Purdue University-West Lafayette via distance education technology to the Crane Naval Surface Warfare Center in Crane, Indiana, in accordance with the background discussion in this agenda item and the supporting document, *New Academic Degree Program Proposal Summary*, November 30, 2011.

#### Background

Purdue University West Lafayette seeks authorization to deliver via distance education the M.S. in Chemical Engineering to the Crane Naval Surface Warfare Center in Crane, Indiana. Crane and the University have had a long working relationship, which moved to a closer partnership, specifically with the Energy and Power Division, “focusing on research and development in several areas, including advanced battery design, testing, and production prototyping.” The agreement with the University will result in Crane paying for the program on a per course, fixed-cost basis, enabling Purdue to fully recover all costs associated with delivering the program. This cohort-based program, which will only be open to Crane employees, is expected to enroll 17 students in the initial offering.

This program will actually be offered in a blended format. While most of the instruction will be offered online, students must come to campus for a required laboratory course, one of the ten courses needed to complete the program. The laboratory course involves three, two-day intensive modules that will be scheduled over a 6-8 week period. All other courses will involve the Purdue faculty member traveling to Crane at the beginning, middle, and end of the semester.

Purdue University also seeks general authorization to deliver this program statewide via distance education technology. However, the action recommended to the Commission at this time is for specific authorization for delivery to the Crane Naval Surface Warfare Center. Pending satisfactory conclusion of the on-going Commission discussion of distance/online education,

as well as further clarification of the Purdue proposal on a few points, a recommendation will be brought to the Commission regarding general statewide authorization. Separating the Crane authorization from the general authorization is intended to allow the delivery to Crane to proceed without delay.

### **Supporting Documents**

- (1) *Program Proposal - Master of Science in Chemical Engineering*, July 27, 2011.
- (2) *New Academic Degree Program Proposal Summary – July 27, 2011*
- (3) *Letter from Vic Lechtenberg to Ken Sauer*, November 9, 2011

Indiana Commission for Higher Education

DISTANCE EDUCATION PROGRAM PROPOSAL

Institution: Purdue University West Lafayette  
Degree Program: MS Chemical Engineering  
Date: 07/27/2011

Item

1. On-Campus Enrollment/Degree History (from SIS):

	<u>FY2009</u>	<u>FY2010</u>	<u>FY2011</u>
Headcount	4	4	4
FTE	4.60	5.25	5.08
Degrees	10	11	11

2. Mix of Technologies:

This program will be delivered by using the following mix of technologies (select as many as apply):

Television:

One Way Video

- IHETS - Satellite
- IHETS - Terrestrial
- IU VIC System
- Cable/Public TV
- Videocassette
- Other : ( explain here )

Two-Way Video

- IHETS - Satellite
- IHETS - Terrestrial
- IU VIC System
- Other : ( explain here )

Internet/Web

- IHETS INDnet
- IU VIC System
- Other : ( explain here ) We will use Adobe Connect for help sessions and Streamed lectures videotaped during regular class sessions.

Computer-Based (CD-ROM, DVD, diskette, etc.)

Audioconferencing/Audiocassette

Print Correspondence

Other : ( explain here ) We will provide opportunities for direct student/instructor interaction by having the instructor travel to the cohort site 2-3 times per semester per

course, once in the first two weeks of the course, once mid-semester, and a third time near the end of the semester if indicated by student progress and needs.

3. Access to the Instruction:

- a. The selected mix of technologies allows students to receive the instruction in the following settings (select as many as apply):

- Home
- Workplace (Including Hospitals)
- Libraries and Other Public, Non-Educational Settings
- K-12 Schools
- Campuses/Centers within the Same System
- All Public Campuses/Centers

- b. Will the institution enroll students in the program from anywhere in the state?

- Yes
- No

( If "No", please explain here ) This is a geographic cohort based program tailored to each company's specified needs. The initial offering will be to the Energy and Power Division at the Naval Surface Warfare Center, Crane Division, located at Crane, Indiana. Future offerings will be based upon cohorts at sponsoring company sites.

4. Schedule for Delivering Coursework:

- a. All required coursework in the major will be offered via distance education technology over a three-year period.
- b. A minimum of four elective courses will be offered via distance education technology each year.
- c. Please explain how students will be able to complete general education, minor, and other curricular requirements outside of the major.

This is a graduate MS program and therefore does not have requirements which fit this category.

5. Off-Campus Curriculum and Instruction:

- a. Will the off-campus curriculum be identical to the on-campus curriculum?

- Yes
- No

( If "No", please explain here )

- b. Will the program require students to complete laboratory or studio work?

No  
 Yes

( If "Yes", explain here ) Students in this program will complete a required three credit in residence laboratory course that will be delivered via three intensive two-day modules running from 10.00 am – 6.00 pm on day one and 8.00 am – 3.00 pm on day two. These sessions will be spread over a 6-8 week period and scheduled with consideration for the cohort's employment obligations. This is a hands-on, team oriented course. Lab experiments include: introduction to electrochemistry, transport effects in battery cells, voltammetry for characterization of cells, impedance spectroscopy for cell characterization, manufacturing technology, heat generation, thermal management, and lifecycle performance. Each experimental module will be preceded by a short lecture with handouts describing the essential physics/chemistry/ engineering principles. A written lab report describing the procedures followed, results obtained, and an analysis of the results will provide the basis for assessment of student progress in this course.

- c. Please explain how the program will provide for timely and appropriate interaction between students and faculty members.

( required ) Each online course will have a website which hosts all course requirements and content, including video lectures for asynchronous delivery. We will conduct live 90 minute help sessions utilizing Adobe Connect video and two way audio as often as weekly based upon student progress and identified need. Homework is normally due weekly. The help sessions will be timed to allow students to attempt the homework and then bring their informed questions for discussion with time to complete the assignment by the due date. The instructor for each course will visit the cohort work site 2-3 times during the course offering, once in the first two weeks of the course, once mid-semester, and a third time near the end of the semester if indicated by student progress and needs. Instructor and course assistant email addresses and phone numbers will be made available to the students.

- d. Will the program require students to come to campus for any period of time?

No  
 Yes

If "Yes," please indicate for how long, with what frequency, and for what purpose. Students will come to campus 3 times over a 6 to 8 week period during the third semester of the program in order to attend a required laboratory course.

( If "Yes", explain here ) Students in this program will complete a required three credit in residence laboratory course that will be delivered via three intensive two-day modules running from 10.00 am – 6.00 pm on day one and 8.00 am – 3.00 pm on day two. These sessions will be spread over a 6-8 week period and scheduled with consideration for the cohort's employment obligations. See "Laboratory" above for more detail on content.

- e. Please explain how the program will provide for timely and appropriate interaction between students and other students.

( required ) This is a cohort based program. The help sessions delivered via Adobe Connect will go to a single classroom at which the cohort will gather for the help session. Students on travel may join the session so long as they have a web connection available at their travel location. Students will be encouraged to establish their own private Facebook page to facilitate teamwork and collaboration. During the required on campus laboratory course, the students will be introduced to the full time Chemical Engineering Graduate students via tours of laboratories and at least one formal activity such as a pizza night or regularly scheduled graduate student gathering. Our experience shows that active student interaction and access to a variety of advisors/mentors is a key to success in Masters level programs.

6. Assessment of Student Learning:

Please explain how student learning will be assessed.

( required ) Students will complete the same homework and take the same exams as the on campus students that are taking the course. Lab reports will be completed for each experiment in the laboratory course. Research project courses will allow for more qualitative assessment of the student's ability to apply knowledge gained during the program to real world research questions. Homework will be submitted via facsimile to a secure location or by emailing PDF images to a designated address. Graded homework will be returned via the same method to each individual student. Exams will be proctored at the cohort work site by trusted parties. Student mastery of the course material will be assessed via the combination of homework, lab reports, and exam scores.

7. Availability of Academic Support and Student Services:

Please explain how students will have access to each of the following academic support and student services:

a. Admissions

Students will follow the normal on campus application process starting with the Purdue Graduate School's online application. All applications will be reviewed by the MS Chemical Engineering admissions committee. Based upon their admission

requirements they will make recommendations to the graduate school for acceptance or rejection.

- b. Financial Aid  
This program will be marketed to Indiana's employers and employers nationwide. It is anticipated that the employers will pay the full cost on behalf of their employees. In the event that there is cost sharing by the employees we will inform them of the normal financial aid application process. No scholarships or other forms of monetary assistance have been dedicated to this program.
- c. Academic Advising  
Each admitted student will be assigned an advisor selected from the MS ChE faculty team. Unless a change is requested by the student the assigned advisor will remain with the student for the duration of his/her participation in the program.
- d. Course Materials (including delivery mechanism)  
All course materials will be shipped to the students by the online coordinator prior to the start of classes. Additional material may be added during the semester by posting to the secure course website.
- e. Library Materials (including delivery mechanism)  
Students will access required materials via the Purdue library system by logging in with their computer ID "career account" or through inter-library loan.
- f. Placement and Counseling  
Purdue University's Center for Career Opportunities is available to all Purdue students, including those enrolled in this on-line program. The center's counseling and advisory services are accessible to off-campus students via telephone and email when campus visits are not feasible.
- g. Technical support (e.g. on-line help desk)  
All courses will be delivered with technical support from Purdue Extended Campus or Purdue Engineering Professional Education, each of which has technical support services available. In addition, program staff will be available to help troubleshoot issues as they arise.

8. Student Fees:

	Fees <sup>1</sup> Charged per Semester Hour for Part-Time Students	
	<u>Indiana Residents</u>	<u>Non-Residents</u>
On-Campus Instruction	\$336.10	\$916.25
MS ChE by Distance	Notes 2, 3	Notes 2, 3

Notes:

1. Engineering graduate students pay a differential fee of \$543 per semester based upon fall 2011 rates. Fall/Spring semester part time students pay per credit hour: 1-3 hours pay 25% of the Fall/Spring rate.
2. The proposed distance education program is a fixed price program based upon a fee of \$50,000 per course regardless of the number of enrolled students. This fee was calculated to cover all costs to Purdue and guarantee program availability regardless of enrollment as requested by our customer. See attached letter to Dr. Ken Sauer from Vic Lechtenberg, Purdue University for additional details.
3. Rate reviewed annually via Purdue internal business services rate request process.

9. Review Process:

This proposal has been approved for submission to the State of Indiana by the President of Purdue University. The process began with development of a program proposal by the Chemical Engineering faculty in response to a specific identified need for Masters level education for practicing engineers. The proposal was reviewed by the Chemical Engineering department head and recommended to the Dean of Engineering for approval. Upon receipt of the dean's approval the program was forwarded to the Dean of the Graduate School at Purdue University, who recommended approval to the Provost. After accepting the Dean's recommendation to approve, the Provost endorsed the proposal and recommended approval to the President of Purdue.

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<sup>1</sup> All tuition and mandatory fees

**NEW ACADEMIC DEGREE PROGRAM PROPOSAL SUMMARY**

July 27, 2011

**I. Prepared by Institution**

Institution/Location: Purdue University West Lafayette to be offered via distance education technology to the Crane Naval Surface Warfare Center in Crane, Indiana

Program: M.S. in Chemical Engineering

	Year 1 FY2012	Year 2 FY2013	Year 3 FY2014	Year 4 FY2015	Year 5 FY2016
Enrollment Projections (Headcount)					
Full-Time	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Part-Time	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>
Total	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>	<u>15</u>
Enrollment Projections (FTE)					
Full-Time	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Part-Time	<u>6</u>	<u>6</u>	<u>7</u>	<u>6</u>	<u>6</u>
Total	<u>6</u>	<u>6</u>	<u>7</u>	<u>6</u>	<u>6</u>
Degree Completions Projection	<u>0</u>	<u>0</u>	<u>15</u>	<u>0</u>	<u>0</u>
New State Funds Requested (Actual) *	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
New State Funds Requested (Increases) *	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>

**II. Prepared by CHE**

New State Funds To Be Considered For Recommendation (Actual) *	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>
New State Funds To Be Considered For Recommendation (Increases) *	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>

CHE Code: 11-37

Campus Code: 1825

County: Martin

Degree Level: 11

CIP Code: Federal – 140701; State – 140701

\* Excludes new state dollars that may be provided through enrollment change funding.

November 9, 2011

Dr. Ken Sauer  
Senior Associate Commissioner for  
Research and Academic Affairs  
Indiana Commission for Higher Education  
101 West Ohio Street, Suite 550  
Indianapolis, IN 46204-1984

Dear Ken:

Thank you for meeting with me on November 3 to discuss Purdue's request to offer our Masters Degree in Chemical Engineering at the Crane Naval Surface Warfare Center. As I explained, Purdue has been working with Crane for a number of years. Within the past two years, we have been developing a much closer partnership, focusing on research and development in several areas, including advanced battery design, testing, and production prototyping.

As a result of this partnership, Crane leaders have described their need to acquire more technical expertise in the area of chemical engineering, especially with regard to evolving battery technologies. Crane leaders and Purdue faculty have agreed that a Masters Degree, offered at Crane, via online and distance delivery technologies, would go far in meeting these needs. Crane has agreed to pay the full costs for offering this program, and to do so on a fixed cost basis. In other words, the costs are not on a credit hour basis but, rather, on a course basis, independent of the number of students in the course. Plans are to offer 10 courses, all at the graduate level. These courses will constitute a typical offering for Purdue's Master's Degree in Chemical Engineering.

The Indiana Commission for Higher Education's approval forms require an indication of the cost per credit hour. This is not an appropriate calculation in this case. Thus, rather than enter a number, we have referred to this explanation. Crane has agreed to pay \$50,000 per course. We believe this will cover all of Purdue's costs to offer this program. As a point of reference, should there be 17 students in a course, the cost per credit-hour would be essentially equal to Purdue's non-resident per credit-hour charge for 2012.

Purdue is pleased to be able to partner with Crane and the State of Indiana to help grow Indiana's technology based economy. We believe this Master's Degree program is a good example of how Purdue can contribute to expanding Indiana's high tech workforce—in ways that are unique to a research university. This is not an open enrollment program, but one that is specifically designed to meet Crane's needs. If this program is successful, Purdue may develop more such programs, but only if there is a market sufficient to fully recover our costs.

Thank you again for meeting with me and offering suggestions as to how to best describe this program so as to provide the information the Commissioners need to be comfortable approving our request. If you have any additional questions, please feel free to call me or Nancy Bulger.

All the best,



Vic Lechtenberg