UNIVERSITY OF LOUISIANA
AT LAFAYETTE

STEP Committee

Technology Fee Application

Cabot Chemical Process Simulation Laboratory Upgrade to Maintain Compliance with Accreditation and Curriculum Outcomes

Title

Dr. Rafael Hernandez and Mr. Jim Dooley

Name of Submitter
(Faculty or Staff Only)

Chemical Engineering

Organization

Title: **Cabot Chemical Process Simulation Laboratory Upgrade to Maintain Compliance with Accreditation and Curriculum Outcomes** Date: 01/15/2020

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ABSTRACT (250 words or less):
The Cabot Process Simulation Laboratory (see pictures below) was made possible by a $75,000 donation from the Cabot Foundation in 2014. The laboratory is equipped with 40 computers. Some of the computers date back to 2012 (15 computers from a previous STEP Grant). These old computers were upgraded with more RAM and better hard drives to keep up with software demands. New computers were purchased as part of the Cabot gift in 2014. The Cabot Process Simulation Facility is a show piece facility for the chemical engineering department and contributes to student training for better job opportunities, accreditation, recruitment, and achievement of student outcomes that enhance the reputation of the program and the university. The Cabot facility is essential to continue training our students for high paying jobs in the chemical process industries and international competitions, which validate the value and reputation of the program as one of the top chemical engineering design programs nationally. The accreditation evaluator for the Accreditation Board for Engineering and Technology (ABET) clearly indicated that our plant/process design sequence is one of the most comprehensive he has seen in all his program evaluation experiences. In order to continue the educational achievements directly associated with the lab, the hardware needs to satisfy the demands of the software. The proposed new computers will fulfill this purpose for the next 5 years.

Purpose of Grant and Impact to Student Body as a Whole:
The Cabot Process Simulation Laboratory (see pictures below) was made possible by a $75,000 donation from the Cabot Foundation in 2014. The laboratory is equipped with 40 computers. Some of the computers date back to 2012 (15 computers from a previous STEP Grant). These old computers were upgraded with more RAM and better hard drives to keep up with software demands. New computers were purchased as part of the Cabot gift in 2014. The laboratory is essential to provide UL chemical engineering students the skills necessary to perform at a high level within chemical process industries. Aspen, a chemical process simulation package use by over 80% of the industry, is installed in all computers. Mastery of this software is directly linked to program accreditation. Students have to apply chemical engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. The software can be used to design specific unit operations (e.g., reaction, distillation, heat transfer), assess the combination of unit operations to achieve a specified objective based on economics, product purity, consumption of utilities, among many other features. Mastery of the software, and thus, the use of this laboratory facility, ensures graduates from the program are capable of designing and optimizing chemical facilities, one of the top sources of high paying jobs in Louisiana. The laboratory also serves as a classroom for other chemical engineering courses requiring the use of other specialized software (e.g., Matlab, Polymath, Visual Basic, Excel). The facility is used 7 days a week during the fall, spring, and summer semesters. It is also a key space to meet prospective students, and thus contributes to recruiting and the growth of the program.

The current computers in the laboratory are at least 5 years old. Some of the computers are over 8 years old. As software evolves to tackle more complex engineering problems, the current hardware will not be able to work effectively for the students. As a department we need to train our students to create state of the art and innovative engineering solutions. It is part of the UL Mission and Strategic Plan. Therefore, we request resources to replace all the computers in the Cabot Process Simulation Laboratory and continue to maintain one of the top chemical engineering design course sequences in the country.

As mentioned above the facility is also used to teach several other specialized software. Thus, the facility has a direct impact on the following courses/student numbers (see Table below)

CHEE Courses	Fall 2018 Enrollment	Spring 2019 Enrollment	Fall 2019 Enrollment
CHEE 210-Engineering Analysis	8	44	6
CHEE 302 – Transfer Operations		65	12
CHEE 400 – Process Simulation	28		57
CHEE 401 – Stage Operations	62		60
CHEE 403 – Unit Op Lab 1	56		58
CHEE 404 – Unit Op Lab 2		46	
CHEE 407 – Plant Design	62		68
CHEE 408 – Process Design		48	
CHEE 413- Process Control		58	
CHEE 420 – Reaction Engineering	71		73
Total	**287**	**261**	**334**

It is clear that the Cabot facility has a direct impact on almost all the courses in the chemical engineering curriculum. Approximately 300 users per semester (see Table above) take advantage of the facility for training on specialized software, homework, preparation of reports, and lectures. It is my strong believe that the Cabot Process Simulation Laboratory was one of the reasons the department achieved accreditation during the 2019 visit with zero observations.

The new computer we propose to purchase is the DELL Precision Workstation 5820. We would purchase 40 units at $1547.37 each, totaling $61,894.80. This computer model is recommended by Aspen for the next version of the software.

Projected Lifetime of Enhancement

Since this model of computer is considered medium to high grade, the lifetime of the proposed computers can be projected to be at least 5 years. Purchase of a five-year warranty is included as part of the budget ($4480).

People Responsible

Dr. Rafael Hernandez, Chemical Engineering Department Head, and Mr. Jim Dooley, Chemical Engineering Technician will be responsible for the purchase, installation of software, and maintenance of the proposed new computers. Mr. Jim Dooley has been responsible for maintaining the current Cabot facility computers operational and effective over the last 5 years. He upgraded the old computers to satisfy software demands. He is the main point of contact for the purchase of Aspen licenses every year, and thus, Mr. Dooley and Dr. Hernandez will ensure computers are operating according to Aspen demands. All faculty in the department of chemical engineering train students, as part of course requirements, on specific software (e.g., Aspen, Polymath, MATHLAB, and others), especially faculty members teaching the courses listed in the table above.

Justification

As mentioned above the Cabot Process Simulation Facility is a show piece facility for the chemical engineering department and contributes to student training for better job opportunities, accreditation, recruitment, and achievement of student outcomes that enhance the reputation of the program and the university. For example, recently four chemical engineering students pooled their talents to win (1st Place) an international contest to reduce hazards inside a simulated environment for separating potentially

combustible chemicals (see Figure below). The "ChemEsports" contest blended aspects of chemical engineering, virtual reality and e-sports. Virtual reality is an interactive experience that happens within a simulated environment via computer-generated animation. E-sports, or electronic sports, are video game competitions played on computers and broadcast on screens.

The Cabot facility is essential to continue training our students for high paying jobs in the chemical process industries and these international competitions, which validate the value and reputation of the program as one of the top chemical engineering design programs nationally. The accreditation evaluator clearly indicated that our plant/process design sequence is one of the most comprehensive he has seen in all his programs evaluation experiences. In order to continue the educational achievement directly associated with the lab, the hardware needs to satisfy the demands of the software. The proposed new computers will fulfill this purpose for the next 5 years.

Previously Funded Grants

There was a previous STEP Grant awarded to Dr. Jim Garber, former chemical engineering department head. The grant was awarded in 2012 for the purchase of the 15 computers mentioned above.

Budget Proposal

1.	**Equipment**	**$61,894.80 – DELL Precision Workstation 5820 – 40 units at $1547.37 each. (See attached quote)**
2.	**Software**	**$0**
3.	**Supplies**	**$319.60 – 40 mini display port video adapters**
4.	**Maintenance**	**$0**
5.	**Personnel**	**$0**
6.	**Other**	**$4480.0 – 2 year extended warranty for the 40 computers. The regular warranty is 2 years.** **$400 (miscellaneous, connectors, wiring)**
TOTAL:		**$67,094.40**