

UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

**Acquisition of a biosafety cabinet and an
incubator to promote undergraduate
teaching and research**

Dr. Wu Xu

Name of Submitter
(Faculty or Staff Only)

Department of Chemistry

Organization

Title: Acquisition of a biosafety cabinet and an incubator to promote undergraduate teaching and research

Date: 01/15/2024

Contact Person: Wu Xu

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Department/College/Organization: Chemistry/Sciences

ABSTRACT:

The objective of this project is to re-equip undergraduate teaching and research labs with cell culture capacity. The biosafety cabinet funded by the Board of Regents Support Fund approximately twenty years ago were heavily used for undergraduate teaching and research for more than ten years. However, it did not work last semester. The technician concluded that it cannot be repaired. The chemistry department is undergoing a transition from a program with a primary undergraduate teaching focus to a unit with a strong research presence at both the undergraduate and graduate levels. The top priorities are to (i) enhance research capability by developing collaborative and individual ground-breaking and/or transformative projects and (ii) improve the educational and research infrastructures including development of equipment proposals. The chemistry faculty members submitted five equipment proposals and one educational proposal to the Board of Regents Support or NSF in the last two years for improving educational and research infrastructure. The higher-level undergraduate and graduate lab courses often need specialized instruments for students to gain hands-on experiences. It is estimated that >100 students from 300- and 400-level courses each year will be benefited from the instruments requested. Besides the benefit for teaching, this cell culture capacity will enhance undergraduate research and training. In summary, the improvement of student teaching and the exposure to the project-oriented learning will strengthen educational components of our science curricula and research productivity.

Acquisition of a biosafety cabinet and an incubator to promote undergraduate teaching and research

A. Purpose of grant and impact to student body as a whole

The chemistry department is undergoing a transition from a program with a primary undergraduate teaching focus to a unit with a strong research presence at both the undergraduate and graduate levels. The top priorities are to (i) enhance research capability by developing projects with novelty and uniqueness and (ii) improve the research and educational infrastructures including development of equipment proposals. Research facilitates experiential learning and demonstrates the nature of science. Many of our students conduct research for two or more semesters and their work has resulted in multiple publications. One great advantage of an undergraduate research experience is the opportunity it provides a student to work in a research-equipped laboratory on a scientific problem that will take the student beyond the scope of textbook instruction. All eleven chemistry faculty members in chemistry have students enrolled in their Chemistry 362/462 undergraduate research course. The main purpose of this proposal is to acquire a biosafety cabinet and a small incubator used primarily by the biochemistry, organic and macromolecular disciplines of chemistry. Of course, there may be times that all areas of chemistry will use the requested equipment. In fact, the teaching labs from sophomore to senior level chemistry will use the biosafety cabinet and the incubator.

This proposal is focused on acquisition of two instruments: a biosafety cabinet and an incubator or a shaker. A biosafety cabinet is a ventilated workstations designed to provide protection for personnel from pathogens and sterilized conditions for the materials being worked with in the laboratory as it filters both the inflow and exhaust air. The biosafety cabinet funded by the Board of Regents (BoR) Support Fund approximately twenty years ago were heavily used for research and teaching for more than ten years (**Figure 1**). However, it did not pass the safety inspection in 2015 (**Figure 2**). The Biosafety cabinet shall be vented from the building if toxic or malodorous chemicals are used.

The inspector from LLOMETRICS, INC tested it in 2015 and did not approve its use in research and teaching probably because the external exhaust blower did not work appropriately. It caused no longer correct airflow inside the cabinet. This unit was still used for research and teaching by the faculty with



Figure 1. The current biosafety cabinet in Biochemistry Teaching Lab (MY 221). It is not functioning now and cannot be repaired.



Figure 2. It did not pass the safety inspection in 2015.

great caution before the pandemic. The students cannot use it because of the safety concern. During the pandemic from 2019 to 2020, the teaching lab experiments were divided into two categories: actual experiments being performed in the lab and learning lab experiments through computers. Therefore, this biosafety cabinet was not used for two years. In 2021, it was used again for a very short time. Last semester, it did not work completely. Chemistry is not eligible for competing equipment proposals in 2023 through the BoR enhancement program because of the rotation policy for different disciplines. Even chemistry is eligible for competing equipment proposals this year, it is difficult to write a proposal for acquisition of just a biosafety cabinet because no experimental data can be generated from it. An incubator or a shaker is needed for cell culture and a certain type of chemical reactions.

Dr. Xu from Chemistry has worked with Drs. Cassin-Sackett, Kooyers and Schmidt from Biology, and Dr. Chen from Computer Science to develop an educational proposal to NSF REU program for enhancing undergraduate education and research. The educational activities proposed in the NSF proposal will be positively impacted by this STEP proposal and *vice versa*.

B. Projected lifetime of enhancement

Dr. Xu will be responsible for the training of the undergraduate students in biochemistry. Specific small projects for the undergraduate students have already been proposed and students are presently working on their research project. Undergraduate students' training can be divided into two phases: the first phase is hands-on skill training, and the second phase is development of research thinking and accomplishment of a study at a small scale. The biosafety cabinet and the incubator/shaker will be installed by Dr. Xu and the graduate students in the lab. The biosafety cabinet will be used on daily basis and maintained by the faculty members, graduate and undergraduate students who use it. The incubator will be maintained by chemistry stockroom staff and graduate students. It will be used daily. All undergraduate students will be trained how to use the biosafety cabinet and the incubator by Dr. Xu. He has trained 203 undergraduate students for over the past eighteen years. As stated earlier, thirty-five undergraduates from Dr. Xu's lab have been the coauthors in sixteen peer-reviewed publications. Thirty-seven undergraduates were acknowledged in five papers. Five undergraduate students presented their work in the undergraduate research conference held in November, 2023 at the University of Louisiana at Lafayette (<https://advance.louisiana.edu/node/151>). Three undergraduate students were invited to attend the National Collegiate Research Conference for undergraduate students (<https://science.fas.harvard.edu/national-collegiate-research-conference>) at Harvard University on January 18, 2024. Dr. Xu has three funded grants presently. They are from NSF, NIH and the Board of Regents.

C. Person(s) responsible for

Implementation: Wu Xu

Installation: Wu Xu

Maintenance: Departmental committee made of up faculty members

Operation: Faculty of Chemistry Department

Training: Chemistry faculty will conduct training for students.

Budget Proposal

1.	A biosafety cabinet	\$9,500
	Quantity	1
		Subtotal: \$9,500
	 An incubator/shaker	 \$5,000
	Quantity	1
		Subtotal: \$5,000
2.	Furniture	\$0.00
3.	Software	\$ 0.00
	No software is required.	
4.	Supplies	\$0.00
5.	Maintenance	\$ 0.00
	Routine maintenance will be covered by department.	
6.	Personnel	\$ 0.00
	No personnel required	
7.	Other	\$ 0.00
	None	
<hr/> TOTAL:		<hr/> \$14,500

Note: The quote for a biosafety cabinet is \$17,074. We requested \$9,500 for the biosafety cabinet in this proposal. The remaining support for the biosafety cabinet will be from the chemistry department.

D. Other relevant information

None

E. Previous STEP projects

Drs. Xu, Gallo and Knierim successfully authored the STEP proposals "Smart Classrooms in Chemistry".

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Nbr	Qty	UN	Catalog Number	Description	Unit Price	Extended Price
1	1	EA	09034251PM	HERASAFE 2030I 6 FT 120V UV PM  Thermo Scientific Herasafe 2030i CONFIGURED-NSF Biosafety Cabinet PROMO, Dimensions Exterior: 80 x 190 x 154 cm (31.5 x 74.8 x 60.5 in.), Outlets: 4 Rear Wall, Certifications/Compliance: NSF/ANSI 49, Chamber Material: Stainless Steel (316), Model: HeraSafe 2030i, Sash Opening: 25.4 cm Vendor Catalog # 51032335TU This item is being sold as 1 per each	17,073.75	17,073.75
2	1	EA	09034257	ADJUSTABLE STAND 6FT GREY  Thermo Scientific Adjustable Floor Stand for Herasafe 2030i, Description: Height Adjustable Floor Stand in increments of 50mm.(Height range 680-880mm), 1.8 m, charcoal grey, Item Description: Adjustable Floor Stand (Height of 680-880mm), 1.8 m, charcoal grey, Length Exterior: 1900mm, Depth: 800mm Vendor Catalog # 50155691 This item is being sold as 1 per each ===== Extended warranty available for purchase below: 11 676 650 EXTENDED WARRANTY BSC \$1373.00 =====	N/C	N/C
3	1	EA	15500207	PLANT GROWTH LIGHT MODULE  Light module for Thermo Scientific and Forma Chambers, For Use With: Plant growth, All Thermo Scientific and Forma vertical light chambers - models 3906, 3909, 3928, 3942, 3943, Stainless Steel, Description: Light module plant growth - for use with vertical light chambers	2,350.00	2,350.00