2013 Student Technology Fee (STF) Proposal Form

Project Title: Huxley College/Dept. of Environmental Science Teaching Lab Centrifuge Upgrade

Department/Organization: Huxley College/Environmental Sciences Dept./Institute of EnvironmentalToxicology

Name(s) of Project Applicant(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>MS</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin Matthews</td>
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</tbody>
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Principal Contact:

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
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<tbody>
<tr>
<td>April Markiewicz</td>
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<td>6137</td>
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</tbody>
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Amount Requested for Project

Proposed Budget:

1. Equipment total $41,376.26
2. Plus site preparation (not STF funded) + $
3. Total Project Cost (spreadsheet total from part IV of this form, Total Project Budget) = $41,376.26
4. Less organization’s contribution – $1,250
5. Less site preparation – $
6. **STF Grant Request** = $40,126.26

**PREREQUISITES**

1. Review the policies (two) and procedure (one) below for using lab fees to purchase equipment. You may decide that this option is more effective for funding your proposal.

   - POL-U1400.03 Establishing and Changing Course and Lab Fees
   - POL-U1400.04 Administering and Spending Course and Lab Fees
   - PRO-U1400.03A Establishing a Course or Lab Fee, or Changing the Amount or Purpose of an Existing Course or Lab Fee, Fixed or Variable

2. Read the updated **II. STF Proposal Form and Instructions** on the Student Technology Fee website.

**IMPORTANT NOTES**
1. Disallowed Proposals:
   a. Proposals for computer lab upgrades – Existing computer labs are upgraded on a rolling schedule, and the Student Technology Fee continues to fund these upgrades.
   b. Combined proposals – The STF Committee accepts single, distinct proposals only.
   c. Proposals for software related to maintenance and/or serial payments

2. THE STF Committee will only accept complete proposals by the announced deadline. Every section (I–IX) and all items of this proposal format must be addressed.

I. Executive Summary (800 words max)

Provide a summary of the project and the benefits to be derived. Explain what the students would gain from the project, and how the acquisition would meet the Student Technology Fee mission.

In Huxley College’s Toxicology Program most students who enroll in the lecture classes also take the two laboratory classes to gain hands-on experience and training in conducting toxicity tests. In the laboratory classes (ESCI 457/557 and ESCI 458/558) students conduct numerous toxicity tests, including some on living organisms. In many of the experiments, both in ESCI 457 and ESCI 458, the use of a centrifuge is required. Throughput must be high in order to accommodate multiple teams of students running multiple samples. The centrifuge that is currently employed, (a Sorvall RC5, see figure #1 and #2 in appendix) for both laboratory classes is an older (early 1990s) discontinued model that has failing hardware and imprecise controls, including temperature, which oftentimes leads to freezing and damaging of samples. Parts to repair or upgrade the model are no longer available. The rotors are outdated and rusty (see figure #3) with small capacities, leading to bottleneck problems during class. Additionally the rotors are ill-fitting, requiring 50 mL vials to be spun without their lids, hence compromising the quality control of many experiments.

This proposal requests funds to purchase a new floor model centrifuge, or, failing that, a less expensive benchtop model. This will ensure that the students have access to the technological improvements and precision instrumentation to meet requirements needed to conduct toxicological tests in accordance with standardized, peer-reviewed scientifically established test protocols. As we prepare our students for careers in the toxicological (and other) sciences, we believe it is crucial to teach them actual procedures and practices used within this scientific discipline; instead we currently show them what equipment they would be using and procedures they should be doing in the "real" professional world, but are unable to because of outdated equipment. This proposed project, if funded, will meet the current and the immediate future needs of the faculty teaching toxicology laboratory classes, as well as the students in our toxicology program. Indeed, interest in a new centrifuge has been expressed by numerous other faculty members with various student research ideas in mind, thus research would expand to incorporate use of an up-to-date instrument.

II. Relationship to STF Objectives / Impact on Current Academic Programs

The STF Committee will use as its primary assessment criteria the three objectives—access, quality, and integration—defined in the STF mission. Given this criteria, describe your proposed project in detail.

1. Tell us—focusing on what the students will gain from the project—how the project would provide positive benefits to specific courses or instructional programs. Specifically:
a. How would this project provide additional student access to technological resources?

This project will provide additional student access to technological resources by providing the students the opportunity (access) to learn how to operate and use a technologically advanced piece of laboratory equipment that is standard equipment in toxicological and biochemistry laboratories around the world. More students will be able to access the centrifuge than ever before due to far higher throughput capability. With greater versatility than what is currently in use, there will be an increased potential for diverse applications, including the processing of larger, higher-volume samples, and of different media, such as soils.

b. How would this project broaden or enhance the quality of the student’s academic experience through the proposed technology?

The primary method by which students integrate and apply what they have learned in the classroom is through hands-on experience. This project will enhance the quality of the student’s experience by providing a centrifuge that is of the same high technological standard as those used in laboratories around the country and the world. The student will gain hands-on experience setting up and conducting experiments involving the centrifuge, which is a marketable skill when looking for employment in the field of toxicology and many other fields of environmental science.

c. How would this project integrate technology into coursework?

Centrifuges are key laboratory equipment used by toxicologists, as well as biologists, biochemists and water quality specialists to extract enzymes, concentrate algal samples and larger volume samples (up to 250 mL soil/sediment samples) and conduct algal toxicity tests; also to extract arbuscular mycorrhizal fungal spores and extraradical fungal hyphae from soil. The new centrifuge requested in this project possesses the latest advances in electronics (enhanced, digital programming for ensuring accurate controls) and materials science (state-of-the-art carbon fiber rotors, far lighter than the old aluminum models of yesteryear) to achieve the highest possible performance. Huxley’s old centrifuge lacks these technological advantages and places the instructor teaching the class, as well as the students learning the experiments as part of their toxicological training, at a disadvantage. Although these new centrifuges are not difficult to learn how to program and use, their technological capabilities enable the student to experience and utilize current technological advances. Students are therefore able to conduct studies that integrate what they learn in lecture class, read in the scientific literature, or hear on the local news with controlled laboratory experiments that they design and conduct. Perhaps more importantly, we eliminate the possibility of teaching students that the equipment they are using and what they are doing experimentally is "good enough for a lab class", when it is not. We also eliminate the message that they have the skills to do experiments with more relevance to current environmental issues, but cannot because of the technological limitations we have in our teaching laboratory. With this centrifuge, the bottom line is that we can teach the students to design and conduct experiments that truly are scientifically valid and applicable. Because of the need for, this fundamental instrument, technology will be integrated in nearly every activity the students participate in during the toxicology laboratory classes as well as numerous other student research projects.

2. Will other departments be involved with this project?

No ☑ Yes ☐ If yes, describe.
3. Has any part of this project previously been funded by the Student Technology Fee?

   No ☒   Yes ☐  If yes, describe.

4. Is the proposed project a pilot project?

   No ☒   Yes ☐

III. Utilization

List the anticipated number of times and duration per each use—per quarter or per academic year—that students would use the proposed technology. The committee is looking for total student hours and total number of unique students who would use the technology in that time period. Explain how you arrived at this utilization.

The centrifuge will be used most days for the ten weeks in each quarter for the ESCI 457/557 and ESCI 458/558 environmental toxicology laboratory classes and would possibly be used by water quality classes as well. During spring and summer quarters the centrifuge will be available for use by students for senior projects, internships, undergraduate research and/or graduate student thesis research. Total time of student use is problematic to discern given the fluidity of experiments that are performed each year and the various durations of each use. A conservative estimate would be having 40 unique students per year using the centrifuge, multiple times per week for various intervals, ranging in duration from one to 20 minutes at a time. Realistically use would be greater, with classes and individual researchers expanding their protocols to take advantage of the upgraded equipment.

IV. Total Project Budget

This section details the estimated cost of the project. Include costs that would be covered—by your department or another source—for ongoing costs such as personnel or operating expenses.

To assist you in preparing your budget, please consult with relevant campus support departments (ATUS, Purchasing, Space Administration, etc.). For more information about these contacts, see the beginning of “II. STP Proposal Form and Instructions” on the STF website.

Attach Excel spreadsheet if you have additional details.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Item Cost</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Sorvall Lynx 4000 floor standing centrifuge</td>
<td>1</td>
<td>$23,817.07</td>
<td>$23,817.07</td>
</tr>
<tr>
<td>A21-24x15C Aluminum Fixed angle rotor</td>
<td>1</td>
<td>$5,405.06</td>
<td>$5,405.06</td>
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<tr>
<td>Bioflex HC ST Steel swinging bucket</td>
<td>1</td>
<td>$8,151.90</td>
<td>8,151.90</td>
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<tr>
<td>4 Bioliner adapters, 10x50 mL</td>
<td>1</td>
<td>$384.56</td>
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</tr>
<tr>
<td>Adapter, 24x15 mL Bioflex HC</td>
<td>1</td>
<td>$300.00</td>
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Note: We recognize your proposed budget as an estimate. Final funding for successful projects will be established after thorough technical review; some costs may need adjusting due to price changes. The STF Committee may impose special conditions on a project; see the STF Program Overview.

1. What funding or contributions are available from your department or other sources?

   **Note:** “Contribution” is defined as a monetary contribution. A vendor discount, for example, is not considered a contribution.

   $500 from the Toxicology Institute
   $500 from the Institute for Watershed Studies
   $250 from the Huxley College Office

2. Could this project be divided into discrete elements that could be funded separately?

   **Note:** A “no” response to this question creates an “all or nothing” proposal. That is, if the STF Committee decides against funding your entire proposal, it will not consider any elements for partial funding. If proposal elements could be funded separately, the applicant is responsible for prioritizing these elements before submitting the proposal.

   **No □ Yes ☒** If yes, summarize and prioritize project segments with cost estimate for each segment.

   Ideally we would like to obtain a floor model centrifuge for the college since it is the most versatile, with more features and capabilities than a bench top model. For example, the bench top model would lack higher speeds and throughput capability that the toxicology lab protocols call for. If funding is somewhat limited we would like to obtain the Sorvall Lynx 4000 floor standing model (listed above, cost is $23,817.07) as well as the fixed-angle rotor ($5405.06) and various adapters ($684.56 total) but could forego the swinging bucket apparatus($8,151.90).

   If funds are extremely tight, we would still be interested in acquiring a less expensive bench top model (total cost, $19,722.18) since it could still perform most, though not all, of the operations that Huxley lab classes require. This document (Part IV above) contains the quote for the preferred centrifuge, the floor model. The quote for the less preferred bench top model is contained on an attached Excel spreadsheet.

3. Are lab fees charged for any of the courses that will use this equipment?

   **No □ Yes ☒** If yes, please note: The total funding requested from the Student Technology Fee must reflect the amount collected from course fees for equipment replacement and/or equipment acquisition. All proposals asking for course fees will be reviewed by the Academic Budget Office.
Though fees are charged in the classes that would use the centrifuge they are not nearly enough to fund the purchase of a new centrifuge.

V. Impact on Existing Resources

Your proposal must address the project's potential impact on existing resources. Give special attention to the impact on data transmission networks (e.g., sources accessed, networking equipment, etc.), and personnel (e.g., staffing, administrative support, faculty support, etc.).

Any proposal that includes replacement of computers should specifically address the feasibility and cost effectiveness of upgrading the computers rather than replacing them.

1. Describe how existing equipment is used. Contrast this to projected use if your project were funded.

   Currently the centrifuge is used little if at all due to its inaccurate controls, ill-fitting rotors, and propensity for freezing samples. When a floor model centrifuge is needed we tend to go to the WWU Chemistry Department to use theirs, if any are available.

   In the laboratory classes (ESCI 457/557 and ESCI 458/558) students conduct numerous toxicity tests, some on living organisms, with some procedures followed directly from the lab manual and some of their own design. In many of the experiments, both in ESCI 457 and ESCI 458, the use of a centrifuge is required. For example, ESCI 457’s lipid peroxidation test requires that samples be centrifuged multiple times, anywhere from 3000xg to 15,000xg in order to remove larger tissue particles and clear turbid samples.

   Ideally, the centrifuge should be used for most experiments in a toxicology lab. Instructors are often faced with the real pedagogical challenges of a) how to teach students the correct way to conduct an experiment without the proper technology, and/or b) how to explain to the students what should be done instead of what is done, and why this is or is not good enough. Moreover, outside of the classroom, students (undergraduate and graduate) are limited in the scope of the experiments they can conduct as part of a(n) independent study, senior project/thesis, or Master’s thesis research project. We anticipate that due to the enhanced technological capabilities of the new centrifuge it will be in more demand and used by more students, as well as faculty, not only for class, but also for research projects. What we have currently is simply not adequate for the very basic needs we have to provide the best experiential learning experience for our students.

2. Is similar equipment or technology available elsewhere on campus—such as the Student Technology Center, Classroom Services, Video Services, Western Libraries, a college lab?

   No ☐ Yes ☒ If yes, describe why the existing equipment does not meet the needs outlined in this proposal.

   Huxley classes sometimes use the centrifuges belonging to the WWU Chemistry Department, but the arrangement is not ideal since the centrifuges are not always available and accessing them requires transporting samples out of the building. Their centrifuges need to accommodate the ongoing teaching and research demands of their faculty and students; as a result, these centrifuges are not always available for use by us or our students. There is also the issue of transporting hazardous chemicals back and forth from the Environmental Studies building to the Chemistry Building to set up or take down toxicity tests. There is the greater potential for accidents and spills to occur either
enroute or in the building. The only feasible and safe option is for Huxley College to have its own centrifuge.

3. If this project involves the replacement of equipment:
   a. Describe the “before and after” configuration changes. (A spreadsheet reflecting these changes may be attached.) Or, write “N/A.”
   The current centrifuge being used is a discontinued Sorvall RC5 model (figure #1).
   b. Describe the costs and benefits of replacing vs. upgrading. Or, write “N/A.”
      N/A

4. Will this equipment be available to students outside your department?
   No ☐ Yes ☑ If the proposed technology would be used by students outside of your department, describe how they would gain access, how equipment availability would be publicized, the hours/week when equipment would be available, and any costs that would apply.
   Students outside of Huxley College’s Department of Environmental Sciences are able to take laboratory classes in the Toxicology Program if they have fulfilled the required prerequisites or obtained permission from the instructor. As a student enrolled in ESCI 457/557 and/or ESCI 458/558 laboratory class, s/he will gain access to use the centrifuge as part of her/his assigned lab experiments. Students outside of the College not taking these classes may also gain access to the centrifuge when not in use for laboratory classes on a case-by-case basis with permission from the faculty in the ESCI Department. Students may contact the Department of Environmental Sciences for referral to the appropriate faculty or directly contact the faculty to find out how to go about scheduling access to, and training on, using the centrifuge.
   Publicizing the availability of the centrifuge will be accomplished by contacting and informing the department chairs in Huxley College of the Environment, the Dean of the College of Science and Technology, as well as the Director of the Shannon Point Marine Center. There are no costs to any student, faculty or staff in using the centrifuge.

5. Does this project involve the check-out of equipment to students?
   No ☐ Yes ☑ If yes, discuss whether or not the Student Technology Center could be assigned this task.

6. Does the department have adequate operating funds to provide ongoing maintenance and support?
   No ☐ Yes ☑ If yes, describe.
   Funds are available from the Department of Environmental Sciences, Huxley College, the Institute for Watershed Studies, and the Institute of Environmental Toxicology to cover the costs of ongoing maintenance and support for this centrifuge. Moreover, Huxley College’s full-time scientific instructional technician is responsible for ensuring that all laboratory classroom instruments and equipment are regularly maintained and repaired when needed. In addition, Scientific Technical Services (SciTech) is located in the
Environmental Studies building across the hall from the Department of Environmental Sciences and provide technical repair services when needed as part of their service to the university.

7. Does the department have adequate personnel funds to provide ongoing staff support for this project?

No ☐ Yes ☑ If yes, describe.

One full-time tenured faculty in the Department of Environmental Sciences, as well as a full-time professional staff with expertise in environmental toxicology teach the toxicology classes. When the faculty or professional staff instructors cannot teach one of these classes, the department and College have discretionary funds to hire a temporary faculty or technical staff person to teach the classes. This is in addition to the College’s full-time scientific instructional technician who is responsible for ensuring that all laboratory instruments and equipment are regularly maintained and repaired when needed.

VI. Space and Site Information

This section addresses any space alteration or site preparation necessary for the proposed project. Site alterations include painting, holes in walls, security systems, carpeting, construction, lighting changes, or conversion of a lab or office.

Special Note: If this project would require any site preparation, or if this project would use any space not currently under your department’s control:

- You must submit a draft proposal to Space Administration by November 28, 2012.
- Space Administration and Facilities Management will then conduct a site survey and respond to you by December 12, 2012 about project feasibility, cost, and schedule.
- You must include the site survey response with your final proposal.

1. Location for installation of equipment or technology.

ES 405

2. Would site modification be required?

No ☐ Yes ☑ If yes, describe the modifications (electrical, air, painting, lighting, security, network access, etc.).

The centrifuge requires no site preparation. It will be located in Environmental Studies (ES) building room 405, which is the environmental toxicology laboratory classroom where the current centrifuge is located. In addition, the dimensions of the centrifuge does not require any modification to doors or the elevator to transport them upstairs to 405 or the Institute’s laboratory on the fifth floor.

3. Would this project use space not currently assigned to your department or area?

No ☐ Yes ☑ If yes, describe.

VII. Project Schedule

Describe your overall implementation schedule. (Remember that project awards are announced during spring quarter, and that projects are to be substantially completed by the end of the calendar
year.) If any site preparation is involved (see section VI above), align your project schedule with the schedule provided by Space Administration and Facilities Management.

Once informed that the project has been awarded funds, the vendor(s) will be contacted shortly thereafter to obtain an updated quote for the centrifuge, including tax and shipping. During summer we will work with the Purchasing Department to finalize criteria for the bid proposal to go out to the vendors, as well as evaluate valid bids that are received. Once the bid is awarded to the vendor we will work with them on delivery to the Environmental Studies building, and if needed work with Transport Services to ensure the centrifuge is moved into the Environmental Studies building by late summer. We anticipate having the centrifuge operable and available for classes by the beginning of Fall 2013 quarter.

VIII. Constraints

List or describe any external or internal factors/constraints that could affect your project schedule, project objectives, or the project budget (e.g., if external approval is required for curricular changes, or if funding must be received by a certain date).

Price quotes for the centrifuge expire after 30 days so there is the possibility for prices to increase somewhat by the time the project is funded, though the amount would be minimal. In transporting the centrifuge to campus we might be required to schedule WWU's Transport Services to provide additional transport services if the centrifuge needs to be delivered to a building with a loading dock first, which the Environmental Studies (ES) building lacks. Transportation from one area of campus to the ES building would add slightly more costs to the project and slightly affect the scheduled installation in ES 405, but would not impact the availability for use by Fall 2013 quarter.

IX. External Funding

This section must be completed for any projects over $100,000. For project budgets of this scale, the applicant should investigate opportunities for obtaining external funding for all or part of the proposed project.

1. Describe the external organization(s) able to provide funding in support of this project.

   Not applicable. This section does not apply since the project is well below the $100,000 limit.

2. Describe the funding cycle for these requests (submission dates, projected award dates).

3. Indicate the amount of external funding that would be requested.

4. In cases where joint funding is requested, what would happen if the Student Technology Fee award is made and the external grant is not awarded?

5. Has a grant proposal already been submitted for all or part of the proposed Student Technology Fee project?