

# UNIVERSITY OF LOUISIANA AT LAFAYETTE

STEP Committee

Technology Fee Application

Building a modern technology lab for aquatic  
ecology courses

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Title

**Dr. Beth Stauffer**

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Name of Submitter  
*(Faculty or Staff Only)*

**Dept. of Biology**

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Organization

Title: Assistant Professor Date: 07/14/2017  
Name (Contact Person): Beth Stauffer  
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Department/College/Org: Dept. of Biology, College of Sciences

**ABSTRACT (250 words or less):**

The Department of Biology currently offers several courses in aquatic science and ecology, which many of the 910 undergraduate majors take to satisfy their requirements for Field or Ecology/Management electives. The department recent reorganized the undergraduate concentrations to include one in Ecology, Evolution, and Marine Biology, which more accurately reflects the educational and career interests of students choosing the current Resources curriculum. This project seeks funding to purchase equipment that will modernize lab and field components of current and future course offerings in aquatic science and ecology, thus better preparing our students for educational and career opportunities in these fields. Specifically, funds are requested to purchase 1) a HD video camera-enabled stereomicroscope system that will bring new capabilities ranging from plankton identification to fish and invertebrate dissections; 2) a state-of-the-art handheld water quality meter that will allow for in-field mapping of freshwater to marine conditions; 3) a water level sensor to monitor hydrologic dynamics in wetlands; and 4) a field-ready tablet to interface with the instruments. Dr. Beth Stauffer, an Assistant Professor in the department, will be responsible for implementation, maintenance, operation, and training of users. Based on current enrollment in twelve existing courses that will use this equipment, a minimum of 140 students/year will benefit from this project. Additional students are expected to benefit as more courses are developed by tenure-track faculty hired into the department in recent years and as UL Lafayette continues to grow as a national center for excellence in aquatic sciences and ecology education.

**Purpose of grant and impact to student body as a whole**

The purpose of this proposal is to modernize the way in which we teach aquatic ecology and marine science, thus providing students in the Dept. of Biology with training that is relevant and responsive to today's careers and research approaches in aquatic, wetland, and restoration science. This grant will benefit many of the 910 undergraduate students who take elective Biology courses in aquatic science/ecology to satisfy their requirements for Field and Ecology/Management Electives. More specifically, over 140 undergraduate students will benefit each year by gaining hands-on experience with the technologies and approaches used in this field and by experiencing higher quality lab and field-based activities in these courses. Students in the newly reorganized Ecology, Evolution, and Marine Biology concentration in the Biology curriculum will also directly benefit from incorporation of modern methods in the many aquatic ecology-focused courses they can take to fulfill their additional requirements. Finally, graduate students in the Dept. of Biology will also benefit directly from this STEP grant. Many of the elective courses in which these instruments will be used are open to graduate students to enroll in as well, and graduate students in the Environmental and Evolutionary Biology Ph.D. program are required to take at least 9 credits in such courses.

There are 12 specific current and scheduled (within the academic year) course offerings that will benefit from this STEP grant and several more expected to be developed in the future. These are listed below and include the course instructors (all tenured/tenure-track faculty), enrollment levels each year, and

specific activities that will incorporate the new technologies. In all, over 140 students each year will directly benefit from improved lab and field-based activities in current course offerings, with even more in new and future course offerings for which enrollment estimates are not yet available.

BIOL 305: Survey of Marine Biology, Dr. Kelly Robinson

Enrollment: TBD (offered by instructor for the first time Fall 2018)

- Stereomicroscope with video camera will be used to show student examples (live and preserved specimens) of plankton. This set-up will help illustrate behavior and movement.
- The YSI ProDSS system will be used by students during a field exercise to collect environmental data at multiple sites in Louisiana coastal waters. Data will be collected in conjunction with phytoplankton and zooplankton samples. Students will analyze data to understand how environmental drivers can alter plankton community structure.

BIOL 319/519: Survey of Invertebrates, Dr. Scott France

Enrollment: 20 students/year

- Microscope system used for class visualization of live animals and dissections.

BIOL 407G: Environmental Toxicology, Dr. Paul Klerks

Enrollment: 40 students/year

- YSI ProDSS system would be used on a field trip on the Vermilion River (in collaboration with Bayou Vermilion District) to sample for contaminant levels.
- Stereomicroscope system would be used in coordination with field trip collecting and identifying benthic organisms in the Vermilion River.
- Stereomicroscope system would also be used in laboratory toxicity bioassay with crustaceans.

BIOL 440G: Estuarine Ecology, Dr. Beth Stauffer

Enrollment: 15 students/year

- Field trips to Cypremort Point and Louisiana Universities Marine Consortium (LUMCON, 2-days) will use the YSI ProDSS sensors to map estuarine conditions in Vermilion and Terrebonne Bays.
- Two lab activities focused on phytoplankton and zooplankton will use the camera-enabled microscope to guide students through identification of plankton taxa.

BIOL 441G: Limnology & Oceanography, Dr. Scott France & Dr. Paul Klerks

Enrollment: 20 students/year

- YSI ProDSS system will be used by students in weekend field trips for oceanography labs and in regular field trips for limnology labs.
- Stereomicroscope system will be used to assist with plankton identification in labs.

BIOL 442G: Plankton Ecology, Dr. Beth Stauffer & Dr. Kelly Robinson

Enrollment: TBD (offered for the first time Spring 2018)

- The stereomicroscope with video camera will be used to show student examples (live and preserved specimens) of plankton. This set-up will help illustrate behavior and movement.
- The YSI ProDSS sonde will be used by students during a field exercise to collect environmental data at multiple sites in Louisiana coastal waters. Data will be collected in conjunction with phytoplankton and zooplankton samples. Students will analyze data to understand how environmental drivers can alter plankton abundance, distribution, and community structure.

BIOL 446G: Fish Ecology and Management, Dr. James Nelson

Enrollment: 15 students/year

- The stereomicroscope system will be used to lead students through identification of fish larvae and zooplankton collected on field trips. The YSI ProDSS will be used to measure water quality data to interpret fish biomass and density results.

BIOL 461G: Aquatic and Wetland Vascular Plants, Dr. Mark Hester

Enrollment: 15 students/2 years

- Field trips to observe and identify plant species/communities from fresh, brackish, salt marsh and barrier islands will be improved by including sensors to measure salinity, pH, etc.
- LevelTroll sensor can be deployed at appropriate sites to allow for insights into tidal forcing in wetland areas.

BIOL 495/595: Ecosystem Ecology, Dr. James Nelson

Enrollment: 15 students/year

- The YSI ProDSS water quality sensors will be used on field trips to LUMCON, Avery Island, and Vermillion Bay.

BIOL 495/595: Spatial Data Analysis & Management, Dr. Kelly Robinson

Enrollment: 11 students/year (9 graduate; 2 undergraduate; first offered Fall 2017)

- The YSI ProDSS sonde will be used by students during a field exercise to collect environmental data at multiple sites in Louisiana coastal waters. Students will perform geostatistical analysis on these data to understand how to interpret point source physical data.
- Data from the water logger will be combined with other available hydrological stations in the Gulf of Mexico to examine long-term changes in time and space central Gulf coastlines. Data from both instruments will be incorporated by students into a geodatabase as part of their coursework.

BIOL 551/552: Biology Seminar Science Communication, Dr. Kelly Robinson

Enrollment: 6 students/year (first offered Fall 2017)

- Stereomicroscope with video camera will be used to teach students how to integrate and explain live exhibits into science communication programs.

BIOL 605: Coastal Restoration Ecology, Dr. Mark Hester

Enrollment: 15 students/2 years

- While this course does not have a formal lab section, it does include 1-2 visits to restoration sites, some with existing monitoring stations/CRMS.
- These visits will be augmented with the equipment purchased through this grant to allow for in-the-field, real-time team monitoring
- Monitoring of the experimental wetlands at Cade Farm with the purchased water level and water quality sensors will also provide relevant comparison with the natural systems.

**Projected lifetime of enhancement**

- The stereomicroscope system is a top-tier offering from Olympus and is expected to last for at least 10-20 years

- The water quality and water level sensors are expected to perform well for at least 5 years with periodic maintenance. They are likely to last for more than ten years with proper use and care.

### **Responsible Person(s)**

- a. Implementation: Dr. Beth Stauffer, Assistant Professor.  
Dr. Stauffer will be responsible for overall implementation, installation, training, and general maintenance. Dr. Stauffer has been on the UL Lafayette faculty since 2015 and, in that time, has developed two new courses (Estuarine Ecology, Plankton Ecology) that incorporate lab- and field-based activities. She is an accomplished biological oceanographer who routinely uses microscopy and modern sensor technologies in her research, and her mentoring goals for undergraduate and graduate students include preparing them for today's careers in aquatic and marine sciences.
- b. Installation: Dr. Beth Stauffer.  
Dr. Stauffer will coordinate installation of the equipment, which will primarily be housed in BLD 122 when not being used by faculty for lab or field activities elsewhere.
- c. Maintenance: Dr. Beth Stauffer and other faculty.  
All faculty using the equipment will go through a check-out procedure with Dr. Stauffer. Additionally, faculty will support ongoing maintenance of the equipment by requesting calibration and maintenance supplies (e.g. pH solutions, conductivity standards, <\$100/course) through routine departmental lab fee.
- d. Operation: Dr. Stauffer and other faculty.  
Dr. Stauffer will be responsible for interfacing with the vendors to ensure sound operation procedures. All faculty using the equipment will be trained in operation (see below) prior to use in courses.
- e. Training (with qualifications): Dr. Stauffer and other faculty.  
Dr. Stauffer will lead training sessions once per semester in use of the equipment purchased as part of this grant with faculty and teaching assistants who intend to use it. Course faculty and teaching assistants will be responsible for training students in safe and continued operation of the equipment.

### **Budget Justification**

All costs are based on quotes from the equipment vendors. The Olympus SZX-ZB7 stereomicroscope system (\$10,456.60) comes equipped with a focusable objective (0.75-4 X), which gives it maximum flexibility for different applications ranging from fish/invertebrate dissections to identification of plankton, Chrome II HD digital video camera (1080p, 60 frames per second) which is ideal for real-time and real-color imaging, and HDMI output to an HD monitor (24") and/or high-quality projector (not included in current budget). This price includes a 4% discount.

The YSI ProDSS sensor system (\$6,740.50) is the state of the art in handheld systems for water quality monitoring. It comes equipped with sensor probes for temperature, depth, conductivity (from which salinity can be derived), pH, dissolved oxygen, and turbidity. The system also comes with integrated GPS system, which can be used to efficiently geo-locate monitoring stations in the field, and a 4 m cable that is sufficient for depth profiling in the shallow lakes, rivers, and estuaries that dominate the south Louisiana watershed. This price includes a 15% discount.

The In Situ LevelTroll water level sensor (\$1,970) comes equipped with a 15 ft cable and the software required for data download and management. The Dell Latitude 5285 tablet is a small (12"), field-portable option with sufficient processor speed (7th Generation Intel Core i3-7100U - Dual Core, 2.40Gz, 3MB cache), operating system (Windows Pro 10), long battery life (12.5 h), and multiple USB ports for interfacing with the water quality and water level sensors. The tablet price is based on the UL Lafayette contract with Dell. We have also included funds for a rugged tablet case (\$50) to protect the tablet when it is used in the field.

### **Previously-funded STEP projects**

Dr. Stauffer has not submitted previous proposals for STEP funding. She is among three new faculty hired since 2015 (with K. Robinson and J. Nelson) and several more senior faculty (see above) in the coastal/aquatic sciences whose current and future course offerings will greatly benefit from this project.

## Budget Proposal

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1.     **Equipment**                    **\$ 20,122.71**

**Olympus SZX-ZB7 stereomicroscope** with focusable objective, digital video camera (Chrome II), and HD monitor: \$10,456.60

**YSI ProDSS meter** with probes for temperature, depth, conductivity, pH, dissolved oxygen, and turbidity, 4 m cable, and integrated GPS: \$6,740.50

**In Situ LevelTroll water level sensor** with 15 ft cable, interface, and data management software: \$1,970

**Dell Latitude 5285 12” tablet** with 7th Generation Intel Core i3-7100U, Windows Professional 10, and three USB ports: \$905.61

**Case for tablet:** \$50

2.     **Software**                        **\$ 0**

3.     **Supplies**                        **\$ 0**

4.     **Maintenance**                  **\$ 0**

5.     **Personnel**                      **\$ 0**

6.     **Other**                            **\$ 0**

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**TOTAL:**                               **\$ 20,122.71**

**Instruction Sheet:**

1. Complete the cover page.
2. Complete the abstract page.
3. Give a description of your proposal in 12 pt. font, single spaced, addressing the following points:
  - a. Purpose of grant and impact to student body as a whole
  - b. Projected lifetime of enhancement
  - c. Person(s) responsible for
    - i. Implementation
    - ii. Installation
    - iii. Maintenance
    - iv. Operation
    - v. Training (with qualifications)
  - d. The narrative of the proposal must include the purpose and justification for each of the items listed in the Budget Proposal.
4. Complete the Budget Proposal form.
5. Include any additional information relevant to your application.
6. Discuss all previous funded STEP projects (if any).

**ONE ELECTRONIC COPY (Microsoft Word or Adobe PDF) OF  
PROPOSAL SHOULD BE EMAILED TO  
[stepproposal@louisiana.edu](mailto:stepproposal@louisiana.edu)  
BY DEADLINE DATE.**

**For additional submission instructions and deadlines,  
please visit <http://cio.louisiana.edu/step-process>**

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ACCEPTED!**