Thursday, October 25, 2018

Classroom Innovation Grant Form

These grants provide "start-up" funds for innovative projects meant to enhance student learning. Typically capped at $1000, the grant can support a range of projects: development of curricular materials, course-related student publications, and instructional technology innovations (in some circumstances, technology requests may exceed the typical $1000 cap). This grant cannot be used for a faculty stipend or the purchase of standard course materials. Applications are due on November 1st for the spring and May 1st for the fall.

Name

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Amount requested ($1,000 max)

$1000

If your project involves human subjects, have you discussed this with the director of the Institutional Review Board?

Not applicable

Project title

Applied Bioinformatics: Environmental DNA sequencing with Oxford Nanopore MinION technology

Description of the project (750 words max)

Spring 2019 will bring the first iteration of the new Applied Bioinformatics (BIO332) course. In this class, the students will work on collaborative group projects in bioinformatics that will be focused on using and reproducing current research with cutting-edge bioinformatics techniques.

With the support of this grant I would like to integrate into this class real-time DNA sequencing of environmental DNA samples using the Oxford Nanopore MinION portable DNA sequencing device. This technology allows the user to perform high-throughput DNA sequencing in a device the size of a thumb drive and over the course of hours. The MinION starter kit costs $1000 and is sufficient to do 2-4 sequencing experiments. The low initial costs, rapid implementation, and small size of this device are revolutionizing the way we can do DNA sequencing.

Working with the MinION students will sequence DNA from an environmental source (e.g., soil, water, dust) using a standard metagenomics pipeline. The students will then analyze the raw data to identify the organisms present in their sample(s).

Discuss the benefit to the Stonehill community

The integration of this cutting-edge technology in the Applied Bioinformatics class will bring real-world training to the Biology curriculum. Students will be collecting and preparing samples, operating the device, and recording and analyzing data. The projects will create new datasets and results that are likely to be independently publishable.

This kind of training is essential to Biology graduates headed into graduate school or jobs related to research. While the technology they encounter will be different it is important for the students we train to be able to learn and adapt to each new project the encounter. The addition of the MinION sequencing to Applied Bioinformatics will mesh data acquisition and processing in a real research scenario that will reinforce the need for students to become proficient in bioinformatics data skills.

How will you share your project findings or outcomes with the Stonehill community?

The use of real-time DNA sequencing in class will be presented to the Biology Department (and other interested) faculty at the end of the semester. The instructor will write detailed protocols adapted to the learning environment of an undergraduate biology lab class. These materials will be archived on OneDrive and shared with the Biology Department faculty.

Please detail your budget.

This grant would support the purchase, at the cost of $1000, of one MinION Basic Starter Pack from Oxford Nanopore: https://store.nanoporetech.com/starter-packs

This kit contains everything required to perform 2-4 sequencing experiments. Any supporting supplies will be requisitioned from existing supplies or supported by department funds.

Syllabus (optional)

Applied Bioinformatics.docx