Division of Academic Affairs
Technology Fee – Project Proposal
2015

Project Proposal Type

Instructional Technology Enhancement Project (ITEP)

Focused projects proposed by an individual or small team with the intention of exploring new applications of instructional technology. ITEPs will typically be led by a faculty "principal investigator." ITEPs are time-limited projects (up to two years in length) and allocations of Technology Fee funds to these projects are non-recurring.

Project Title

<Laptop computers for phage hunting – the SEA phage program at UWF>

Total Amount of Funding Requested

<$11,256.00>

Primary Project Coordinator

<Kari B. Clifton>

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ITEP proposals must provide the following information:

1. **Project description.**

   In December 2014 the Biology and Chemistry departments were jointly invited to join
   the SEA-PHAGES program, through a nationwide competitive application process
   (spearheaded by Dr. Hui-Min Chung in Biology). The SEA Phage Hunters Advancing
   Genomics and Evolutionary Science, or PHAGES, is a research-based laboratory course
   built around a national experiment in bacteriophage genomics
   (http://www.hhmi.org/programs/science-education-alliance). The program is
   administered by the Howard Hughes Medical Institute's (HHMI) Science Education
   Alliance (SEA) division. First year undergraduate students participate in wet lab and
   bioinformatics research as they discover and investigate new bacteriophages (phages). In
   the first term, the students isolate phage from locally collected environmental samples.
   They then spend the rest of the term purifying and characterizing their phage and
   extracting genomic DNA. The purified DNA is sequenced. In the second term, the
   students receive files containing the DNA sequences and use bioinformatics tools to
   annotate the genomes. They additionally perform comparative genomics with data from
   other phages, many of which have been isolated by other SEA schools.   HHMI provides
   proprietary software for the annotation and comparative genomics studies. UWF must
   ensure access to computers to be used run the software. The programs run only on the
   Windows platform. The course meets in the laboratory 6 hours per week, for two
   semesters. Because of the specialized software, the amount of time the students will
   spend on the analyses, and the amount of instructor interaction required, it is not practical
   to have the students moving between the lab and computer labs on campus. I am
   requesting 12 laptop computers for the SEA-PHAGES program.

2. **Description of project alignment with UWF Strategic Plan.**
   The project most closely aligns with strategic direction 1 in that students are actively
   engaged in their learning when they are troubleshooting molecular techniques and
   evaluating high-quality genomics data. The SEA-PHAGES program is a model research-
   based curriculum developed to engage college students in true scientific discovery as
   early as possible in their academic careers.

3. **Description of benefits provided:**
   a) *Ways in which student access to technology will be enhanced.*
      Genome annotation and comparative genomic analyses (bioinformatics) are
      techniques at the forefront of modern science.

   b) *How the student experience will be enhanced.*
      Students learn science through research: they receive training in cutting edge
      molecular and genomics techniques; they develop critical thinking skills; they have

opportunities for professional development. The year-long course offers students ownership of a project, and a chance to publish and contribute to the scientific community. This program routinely results in peer-reviewed publications authored by the students. To date, of the bacteriophage genome submissions on GenBank, 87% are from the SEA-PHAGES project. At the end of the year, selected students attend the annual SEA-PHAGES symposium to present their research. Programmatic assessments show that SEA-PHAGE students are more productive, competitive, and prepared for advanced research opportunities and graduate school later in their undergraduate careers.

c) *How assessment will be conducted.*
National standardized assessment of the SEA-PHAGES course includes the administration of various pre- and post- course surveys, as well as longer term longitudinal student tracking. The exact nature of our assessments within the course have yet to be established by the committee, but will likely include some traditional assessments such as writing research papers. Ultimately, the students will have the ability to submit their original research for peer reviewed publications in scientific journals; this is an exceptional opportunity for first year students. To date, of the mycobacteriophage genome submissions on GenBank, 87% are from the SEA-PHAGES project.

d) *Which and how many students will be impacted.*
Enrollment in the SEA-PHAGES program for the first year (Fall and Spring terms) will be 24-30 students. The students are selected from a competitive application process. It takes the place of Bio1 and Bio 2 labs, and Chem 1 and 2 labs. After the first year we are considering opening it up to students interested in STEM, regardless of major. We have the option to increase the number of sections for subsequent years; however, the exact number will be determined at a later date. Initially we have funding to run this program for four years, with the possibility to extend beyond that.

Additional uses of the laptops will benefit a large number of students (see #4 below). The number of students enrolled in BSC2010L (Biology I for majors) was 408 in Fall 2014 and is 148 for Spring 2015. BSC 1005L (General Biology for non-majors) has a total of 312 enrolled in lab this academic year (192 in Fall and 120 in Spring). We have experienced an increased demand for these courses, and we expect the numbers to grow significantly for the majors course, as we may begin to offer it in Summer sessions.

e) *How students with special needs or disabilities would be helped.*
Students with special needs may benefit from having a computer available to them during the laboratory sessions. The computer offers visual and tactile modalities to students; this may increase learning not only students with disabilities, but all students can benefit from stimulating additional senses. Additionally, it allows students to work at their own pace. This will be particularly important throughout the genome annotation phase of this program.

f) *How training of students and faculty in the use of technology would be enhanced.*
HHMI provides comprehensive training in all laboratory techniques for faculty instructors through two weeklong workshops at their facility. Students will learn how to use cutting edge genomics software. The skills students learn in this course are currently in demand in the fastest-growing fields within biology.

4. **Description of how the initiative has a potential scope within and beyond that of the proposing unit.**
   I plan to use the laptops for a number of other biology laboratories as well:
   1) There are a growing number of innovative, virtual labs available online; lab experiments and simulations can be used successfully to teach biological concepts that may be difficult to teach interactively in the classroom. For example, Howard Hughes Medical Institute's "BioInteractive" is a series of free online interactive laboratories. It includes one activity called "Lizard Evolution Virtual Lab" that explores the evolution of the anole lizards in the Caribbean (http://www.hhmi.org/biointeractive/lizard-evolution-virtual-lab). The virtual lab includes four modules that investigate different concepts in evolutionary biology, including adaptation, convergent evolution, phylogenetic analysis, reproductive isolation, and speciation. Each module involves data collection, calculations, analysis and answering questions. This is a particularly fun way to teach evolution to non-majors. This particular lab has the added benefit of examining an organism that is familiar to Florida residents; it's an animal the students can relate to. Virtual labs are for all BSC2010L and BSC1005L students.
   2) One important idea to introduce to new biology majors is the use of mathematics and statistics in biology. For example, I am implementing a new mitosis/meiosis exercise this Spring 2015. Students will prepare their own slides from onions that have been exposed to a mitogen or to a control treatment. They will count the number of cells in each stage of mitosis, and compare the two groups to the "expected" outcome with a Chi-square test. Students will learn how to program the calculation in Excel, interpret the results, and make a conclusion about the effect of the mitogen on cell division. My experience has been that many new biology students have not had much experience using basic statistical and graphing functions in programs such as Excel. It is far easier to teach them when all students can work through the steps in the lab, with the instructor demonstrating on the A/V system. Introduction to basic biostatistics is for BSC2010L students.
   3) The LabQuest2 units in my other proposal can be connected to the laptops. Although the LabQuests units are stand-alone instruments, they can be connected to laptops to download data for processing, more sophisticated analysis, and generating lab reports. These would be used by both the majors and non-majors biology labs.
   4) The Biology Department has several BIOPAC data acquisition systems, used in the human physiology courses. Dr. Pritchard is seeking to replace the existing units with ones that can do more sophisticated experiments than the present units are capable of. When new units are obtained, the old units would be donated to the lower division courses. Laptops are required to run the units, which require proprietary software. I would use them for the General Biology for non-majors lab (BSC1005L).

5) I will reiterate that we would like to open up the course to all STEM majors across campus as we gain experience with the program.

5. **How will success be measured? Provide metrics.**
HHMI provides standardized pre- and post- course assessments as well as longer term longitudinal tracking of students. Measures include: increased persistence in STEM fields, and student self-identification with learning gains, motivation, attitude, and career aspirations. The Biology Department is administering assessments to biology majors when they enter and graduate from the program. In addition, Dr. Cavnar of the Biology Department currently has a grant to track new student success using a variety of metrics. We would be able to track the SEA-PHAGES students and compare them to their cohort within those existing studies.

6. **Description of resources for the project and projected ongoing resource needs (total cost of ownership for the life of the project) including:**
   a) *Any hardware requirements* – Dell Latitude 14 3000 Series laptop computer (12). Standard configuration recommended by ITS for classroom computers. See accompanying quote for specifications. $11,256.00
   We will utilize the ArgoAir wireless system to connect with the platform for genomics analyses located at the University of Pittsburgh. ArgoAir is currently available in the lab (58A/207).
   b) *Any software requirements* – none.
   c) *Any personnel costs* – none.

7. **Provide the proposed timeline for the project with major milestones and project end dates.** The SEA- PHAGES program was awarded for 4 years, and is set to begin with the Fall 2015 term. I am prepared to begin using the laptops for virtual labs in other courses as soon as the computers are in house.

8. **Include a plan for sustainability of the project beyond the initial project period if applicable.**
The laptops come standard with the 3-year warranty with accidental damage and hardware failure for the same duration. The warranty is provided by Dell and supported by the ITS Help Desk. We anticipate a life expectancy of five years. For repair/replacement costs not covered by the warranty, I have included the laptops in the equipment fees.

9. **Provide any resource matching which might be provided by organizations with appropriate commitment authority documentation.**
None

10. **Indicate which individual or group will implement the project (to help determine any additional costs and resource restraints).**
Dr. Kari Clifton is the laboratory coordinator for the Biology I and II labs for biology majors, and General Biology lab for non-majors, and is responsible for adapting and modifying existing experiments as well as designing new experiments to enhance the curriculum. Dr. Clifton is slated to teach the SEA-PHAGES course Fall 2015, along with

one Chemistry faculty. A committee comprised of faculty from both Biology and Chemistry is charged with overseeing the design and implementation of the SEA-PHAGES program.

11. **Indicate a lead person ("Principal Investigator") for the project for all communications and overall responsibility for reporting and fund utilization.**
Dr. Kari Clifton, Lecturer, Biology Department

12. **Project proposals should be succinct and submitted to the Technology Fee Committee by the deadline with a notice of submission to the chair and the dean or appropriately designated leadership in the unit (Center Director, etc.).**

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Item		Quantity	Estimated Ship Date	Price
	Latitude 14 3000 Series – Build Your Own ($938.00/ea) Dell Latitude CTO 3440 Premier Discount	12	1/13/2015	$16,800.00 ($5,544.00) ───── $11,256.00
Add to List				
	Catalog Number			**25 / cul3440w7pp**

Category	Description	Code	SKU	ID
Processor	Intel® Core™ i5-4310U Processor (Dual Core, 2.0GHz,3M)	7CWTG	[338-BEQO]	146

Catalog Number   **25 / cul3440w7pp**

Category	Description	Code	SKU	ID
Operating System	Windows 7 Professional English64bit (Includes Windows 8.1 Pro license)	DW17P6E	[536-BBBD]	11
Office Productivity Software	No Office License Included	13TMUI	[630-AABP]	1002
Memory	8GB (2x4GB) 1600MHz DDR3L Memory	8G2D6	[370-AAQJ]	3
Hard Drive	320GB 5400rpm Hard Drive	320S3Y	[400-AASR]	8
Video Card	UMA	UMA	[490-BBMU]	6
CD ROM/DVD ROM	8X DVD+/-RW	DVDRW	[429-AAIF]	16
Primary Battery	6-Cell Battery (65 WHr)	6C	[451-BBDR]	112
Camera	Camera Included	CAM	[319-BBBY]	379
Power Supply	65W A/C Adapter, 3-pin	65WE5	[492-BBEM]	1015
Cable	US Power Cord	US25A	[537-BBBD]	20
Wireless	Dell Wireless™ 1705 802.11n Single Band wi-Fi + BT 4.0LE Half Mini Card	DW1705	[555-BBCB]	19
LCD	14.0 inch HD (1366x768) Anti-Glare WLED-backlit	14HDF	[391-BBGQ]	760
Keyboard	Standard Keyboard, English	ENGKBD	[580-AAOC]	4
Security Software	No Security Software	NOSS	[650-AAAM]	1014
Diagnostic CD / Diskette	No Resource DVD	NRDVD	[430-XXYG]	50
Transportation from ODM to region	Standard shipment	STD	[800-BBDN]	200080
Dell Latitude 3440 CTO	Dell Latitude 3440 CTO	3440CTO	[210-AAZY]	1
Documentation/Disks	Documentation English	DOCENG	[340-ACOS] [640-BBJB]	21

Catalog Number   **25 / cul3440w7pp**

Category	Description	Code	SKU	ID
Driver	DW1705 Driver	DR1705	[555-BBKC]	7
Dell Data Protection |Encryption Security SW	No DDPE Encryption Software	NODDPE	[954-3465]	156
Operating System Recovery Options	Recovery media not included	NOME81	[620-AAWD]	200013
Dell Backup & Recovery	Dell Backup and Recovery Basic	DBRBSC6	[637-AAAS]	200076
Non-Microsoft Application Software	Downgrade Windows 7	DWIN7	[319-BBBH] [340-AAUC] [340-ACYL] [340-ADFZ] [340-AFCY] [421-9982] [422-0007] [640-BBDI] [640-BBEU] [640-BBHQ] [640-BBHR] [658-BBMR]	1003
Techsheet	No Quick Reference Guide	NOTSH	[340-AASE]	60
E-Star	ESTAR 6.0	ESTAR5	[340-AAPZ] [387-BBDU]	122
Packaging	Shipment Box	SHIP	[460-BBDK]	465
Optical Drive Software	No Power DVD	NOPDVD	[430-XXYY]	597
Processor Branding	Intel(R) Core(TM) i5 Processor Label	I5INTEL	[389-BCCI]	749
Canada Shipping	US No Canada Ship Charge	USNONE	[332-1286]	111
Retail Packing Label/UPC Label	No UPC	NOUPC	[389-BDCE]	292
Hardware Support Services	3 Year Basic Hardware Service+ 3 Year NBD Limited OS After Remote Diagnosis	U3OS	[940-0009] [940-0147] [940-0309] [940-0348]	29
Accidental Damage Service	3 Year Accidental Damage Service	ACDAM3	[973-9184]	33
Installation Services	No Onsite System Setup	NOINSTL	[900-9987]	32

Price does not reflect applicable shipping, taxes and state environmental fee.

Subtotal $**11,256.00**

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