NDSU Technology Action Plan Request

#1611

I. Action Plan Introduction and Authorizations

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Office of the Vice President for Information Technology

NDSU ORGANIZATION OR UNIT Biological Sciences			
TITLE OF PROJECT Laptop computers for Biological Sciences Instruction			
Project Duration (3 years maximum)	**From:** 1/16	**To:** 5/17	
Type of Project (Check one)	**New** X	**Previously Submitted**	**Renewal**
Total Technology Fee Request $85,900.00			
Project Director **(Must be NDSU faculty or staff)** **Angela Hodgson**	**Campus Address: 201 Stevens Hall** **Phone: 1-6561** **Fax:** **E-mail: angela.hodgson@ndsu.edu**		

Name (Type or Print)	**Signature**	**Date**
Project Director Angela Hodgson	Angela Hodgson	1-15-16
Unit Head Wendy Reed	Wendy Reed	1-15-16
IT Division Consultant Melissa Stotz	Melissa Stotz	1-15-16

Executive Summary (maximum of 175 words)

All Department of Biological Sciences General Biology labs use an inquiry lab curriculum and are taught in lab rooms in the STEM Building. The inquiry lab curriculum requires 2 – 4 person lab groups to have access to a computer for approximately 75% of the lab periods throughout the week. The old Cascade desktop computers that were previously used for General Biology labs cannot be used on the lab table in the new STEM building because it would not allow students enough room to safely work on lab procedures.

In addition, many faculty teaching other Biological Sciences courses in the STEM Buildings active learning classrooms would like to have access to laptop computers to implement new curricula that incorporates more in-class research, data visualization and quantitative analysis activities.

We are requesting two laptop carts that each hold 30 computers and 60 laptop computers. The General Biology Labs will require dedicated use of 12 - 15 laptop computers and the remaining 45 – 48 computers will be available to any professor teaching in the STEM Building.

We will only accept for consideration Technology Action Plan Request forms which are fully completed and signed according to the guidelines listed in the Instructions, pages 1 and 2.

Technology Action Plan Request forms will be opened and reviewed after the submission deadline.

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II. Project Overview

1. How does this project meet student needs?

We need to incorporate the use of computer technology and software into our courses so that students are better prepared for the workforce (e.g., use of excel was indicated as being a critical skill employers require). There are significant problems with asking students to use their private computers in class exercises. For example, students may not have access to a personal computer for financial reasons, students may have private information on their computer that should not be shared with others, students may have older versions of software. By providing access to computers we can ensure that ALL students have access to the equitable resources.

2. What audience does this project directly serve? What audience is indirectly served? How many students are affected?

The project directly serves approximately 2400 – 2500 students per year who enroll in Biological Sciences courses and at least 10 Biological Sciences faculty. About 1000 students per year will be directly served by the use of 12 laptop computers in the General Biology I and II labs and about 1400 – 1500 students per year will be served by the use of an additional 45 laptop computers in 12 other courses.

3. For projects that target a subset of NDSU's students, please describe the possibility for broader application in the future.

If computers are not fully utilized by Biological Sciences faculty they can be used by faculty from other departments who are teaching in the STEM Building.

4. Describe both the immediate and long term impact of this project.

The department has fully embraced teaching in the new STEM classroom building and our students must have access to computers to fully take advantage of this exciting learning space. The short term and long term impacts on our students involve providing access to technology for all students and to provide the kind of education that the stem building is designed to provide.

5. Who will pay for ongoing expenses following the technology fee funded portion of this project (e.g., who will replace hardware or software after it has reached its end of life)?

The Department of Biological Sciences will fund maintenance and equipment replacement.

6. Describe how this project will follow NDSU's best practices in information technology. (Please make sure the NDSU IT Division staff you consulted signs in Part I of this form.)

We are planning to sign a service agreement with ITS for the installation and support of the technology.

7. What service on campus is most similar to the one proposed here? How does this project differ?

This request for laptop computers to be used in the classroom is most similar to the computer labs provided on campus. For most of the instructors intending to incorporate computers in their instruction, the computer labs are not an option because:

- The classes are too large to fit in a standard computer lab
- The classes want to incorporate computer use into instruction happening regularly in the active learning spaces and the computer labs are not set up for active learning in the same way that the scale up classes are
- The classes use computers for many class periods during the semester and scheduling of computer labs for repeated use can be difficult
- There are multiple sections of the class (BIOL 150L – 27 sections, BIOL 151L – 16 sections), so finding computer lab space for all sections of the course is impractical
- The lab courses use the computers at the same time that they are performing other laboratory procedures, so use of the computer labs is not an option.

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III. Project Description (5 pages maximum)

Include information on the background of this project: how did it come to fruition?

Objective: We are requesting funding for the purchase of 60 laptop computers which will be kept on 2 mobile computer carts and available for use in classes taught in the STEM Building. The computer carts will be kept in the Biological Sciences prep room in the STEM Building (Room 212). Dr. Angela Hodgson will coordinate use of the computers amongst the faculty and will maintain a check-out system for the computers. She will also be responsible for coordinate support and maintenance of the computers with ITS.

How Technology is used in Biological Sciences Courses

General Biology Labs: In accordance with recommendations by the National Science Foundation (NSF), the American Academy for the Advancement of Science (AAAS) and the Presidential Committee for the Advancement of Science and Technology (PCAST) to better prepare biology students for today's scientific and health care-related careers, the Department of Biological Sciences has redesigned its General Biology Lab Curriculum (BIOL 150L and BIOL 151L) so that students now complete inquiry labs that teach them the process of science, instead of traditional cookbook labs, and in our upper division courses, we are now striving to provide more opportunities for our students to learn and practice authentic research and job skills – such as quantitative reasoning, use of technology and collaborative problem solving.

The General Biology I and II labs now require students to design, conduct and analyze data from their own experiments. Just as they would in the workplace, the students use spreadsheets for entering, sorting and transforming data, and then use Excel, or a statistical program such as R, to graphically visualize and statistically analyze data. The lab curriculum that we have used for the past 2 years requires students to interface with spreadsheets or statistical programs during approximately 75% of their lab periods.

Other Biological Sciences Courses Taught in the STEM Building: In their report "Vision and Change in Undergraduate Biology Education", the NSF and the AAAS have outlined competencies that all biology programs should be developing in their undergraduates. These include 1) the ability to use the process of science, 2) the ability to use quantitative reasoning, 3) the ability to use modeling and simulation. The new STEM building now provides learning spaces that allow instructors to effectively teach these competencies in the classroom. Instruction in each of these competencies requires students to interface with computers and software and our faculty are excited to begin to incorporate more development of these job-related skills in their courses.

A survey was administered to all Biological Sciences faculty to gauge their interest in using laptop computers in their classroom. Nine instructors indicated that they would use the computers in 12 different courses (in addition to the General Biology Labs) which annually enroll approximately 1450 students (see survey results in Table 1). The majority of instructors are interested in using the computers to develop the competencies recommended by the NSF and the AAAS. Common activities that instructors would like to incorporate into their instruction include analysis and interpretation of biological data, statistical analysis of data, and biological simulation activities.

Table 1. The following table shows the faculty that would incorporate the use of the laptop computers into courses other than the General Biology I and II Labs, the courses in which the laptops would be used, the number of students in each course, the approximate number of class periods per semester during which the intend to use the computers and the activities for which the computers would be used.

Faculty Member	Class	Number students in class	Number of Computers needed per class	Number of class periods per semester that computers would be used	Activity computers would be used for
Dr. Jennifer Momsen	Biol 364 (F)	65	20	16 - 20	Excel data entry, data analyses using statistical software, ecological simulations, online research
Dr. Angela Hodgson	Biol 150 (F)	650	45	10	Excel data analysis and graphical visualization, online research, biological simulations
Dr. Katie Reindl	Zool 370 (F)	50 - 80	25 - 40	3-5	Biological Simulations
Dr. Marinus Otte	Bot 314 (F)	20 - 40	5-20	2-4	Online Research, Computerized tests
Dr. Matt Smith and Dr. Craig Stockwell	Zool 475 (F, Sp)	45	9 - 10	27	Excel data entry, data analyses using statistical software, ecological simulations, online research, video editing
Dr. Erika Offerdahl	Zool 370 (Sp)	50 – 75	35 - 40	16	Online research, data analysis using statistical software
Dr. Julia Bowsher	Biol 359 (Sp)	60	20	3	Data entry in Excel, data analysis using statistical software
Dr. Angela Hodgson and Dr. Wendy Reed	Biol 270 (Sp)	48	24	20	Data entry in Excel, data analysis using statistical
Dr. Matt Smith	Biol 271 (Sp)	20	20	20	Data entry in Excel, data analysis using statistical software
Dr. Jennifer Momsen and Dr. Angela Hodgson	Biol 151 (Sp)	285	45	10	Excel data analysis and graphical visualization, online research, biological simulations
Dr. Erin Gillam	Zool 476 (Sp)	36	9	10 - 15	Excel data entry, data analyses using statistical software, online research
Dr. Marinus Otte	Biol 480 (Sp)	20	5-20	2-4	Online Research, Computerized tests
	Biol 481 (Sp)	20	5-20	2-4	Online Research, Computerized tests

Why can't students use their own laptops?

If computers are not provided for use the in classes and labs, the instructors other option is to have students bring their own laptop computers. Faculty in Biological Sciences have identified a number of problems that make this approach untenable. These problems are summarized below:

Student Privacy and Onerous Student Responsibility - All faculty that expressed interest in using computers in their classroom indicated that the students would use the computers for collaborative group work. For example, in the General Biology Labs, students work in 2 – 4 person groups and each group has 1 computer. Students discuss strategies for data entry and data analysis as a group, and the members of the group take turns actually using the keyboard to interface with the software. Requiring each group of students to bring in a laptop brings up problems with privacy. If a student brings in their personal computer, faculty do not feel comfortable requiring that student to relinquish control of their computer so that all members of the group can use it. Student computers usually contain private information to which they do not want other students to have access. In addition, if we require students to use their own computers in the new SCALE-UP classrooms and project their computer screen on the large monitors, they may have programs or pop-ups running on their computer that are not appropriate for the whole class to see.

Also, when instructors have attempted to have at least one member of each group bring in a computer for group work, they have found that the student might forget to bring the computer or the computer might not be functioning correctly or the person that is supposed to supply the computer does not attend class, which results in the group not being able to participate in the class activity.

Compatibility of software with student computers: Most of the identified uses for computers in the lab or classroom require students to use software that works differently or requires a different configuration depending on the model and age of the computer on which the software is running. Many faculty are interested in having students become proficient in the use of Excel for data entry and manipulation and R for statistical analysis and graphing. Excel often comes preloaded on laptop computers, but the version of Excel that a student is able to access can vary considerably depending on the model and age of the computer. When instructors have attempted to have students use Excel on their own computers, they have found that only some students will have access to some of the important features of the program (for example students using Mac computers do not have access to Excel's data analysis functions that are frequently used in science courses), they are required to become proficient in all the versions of Excel, and they often have to write student directions for every different version of the program that students are using. The difficulty of trying to use many different versions of a program in a class, or of trying to get a program to run on computers that are configured in many different ways takes instructor time away from the objectives of the course and usually results in the instructor dropping the activity from the curriculum. This is unfortunate because students then do not develop proficiency in the use of software and technology that they will be required to use in most science and health-related careers.

Discriminates against students who do not have access to a laptop. Requiring students to bring their own computers in order to participate in instruction discriminates against students who do not have a laptop computer and do not have the resource to purchase one, and against those students who would prefer not to bring their laptop to class everyday.

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IV. Milestones

List the date for each project milestone. These milestones should represent the ***significant*** accomplishments that will be associated with the action plan. For each milestone, please indicate its expected outcome and the means for assessing that outcome. (The table may be extended as needed.)

	Date	Milestone	Expected Outcomes	Means of Assessment
1.	3/1/16	Laptops and laptop carts purchased	All computers received and set-up for student use	Inventory checklist
2.	5/1/16	Computers used in Biological Sciences Courses	General Biology Labs will be able to continue to use their inquiry lab curriculum Other Biological Sciences courses will use computers in their classes for online research, statistical analysis of data and biological simulations	Useage log and end-of-semester survey of faculty
3.	5/1/17	Increased use of computers in Biological Sciences Courses	As faculty begin to design their Fall, 2016 and Spring, 2016 courses that incorporate more use of computers in their classes	Useage log and end-of-semester survey of faculty
4.	5/1/17	Increased use of computers in Biological Sciences Courses	Increased incorporation of quantitative reasoning instruction and collaborative problem solving in Biological Sciences courses	Comparison of student assignments and assessments for 2015-2016 classes (pre-computers) and 2016-2017 classes (post-computers)
5.				

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V. Supporting Documentation

NDSU Technology Fee Action Plan Request
VI. Budget

(double-click on the form to begin entering data)

1.	**NDSU ORGANIZATION OR UNIT** **Biological Sciences**
2.	**PROJECT DIRECTOR(S)** **(Must be NDSU faculty or staff)** **Angela Hodgson**

3. SALARIES AND WAGES			
Personnel description	**Number employed**	**Number of months**	**Funds Requested**
A. Staff	0		
B. Graduate students	0		
C. Undergraduate students	0		
4. TOTAL SALARIES AND WAGES			$0.00
5. FRINGE BENEFITS			
6. TOTAL SALARY, WAGES AND BENEFITS			$0.00

7. EQUIPMENT	
A.	
B.	
C.	
D.	
E.	
F.	
G.	
H.	
8. TOTAL EQUIPMENT	$0.00

9. MATERIALS AND SUPPLIES	
60 Laptop Computers - that are compliant with ITS requirements	$70,920.00
2 Computer Carts each with 30 computer capacity - Spectrum LT30 (See note on Match page)	$4,000.00
Management Software	$1,800.00
Network cables	$300.00
ITS/TSS Service Agreement	$8,880.00
F.	
G.	
H.	
10. TOTAL MATERIALS AND SUPPLIES	$85,900.00

11. TOTAL TECHNOLOGY FEE REQUEST	$85,900.00
12. MATCH (Describe in Match Section)	
13. TOTAL PROJECT EXPENDITURE	$85,900.00

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VII. Budget Justification

At least 12 - 15 laptop computers are currently needed for the General Biology Labs (Biol 150L and Biol 151L) so that we can continue teach our inquiry lab curriculum in our lab rooms in the new STEM Building. The old Cascade program desktop computers that we currently use (purchased from the Cascade program about 5 years ago) are unsuitable given the set-up of these lab rooms.

The additional 45 – 48 laptop computers will be used by at least 9 Biological Sciences faculty in 12 different courses. The laptop computers will allow these faculty to implement active learning pedagogies in, especially activities that emphasize quantitative reasoning and science process skills that are extremely important for students entering today's job market.

The 60 laptop computers that we are requesting will be housed in 2 laptop carts which hold 30 computers each and which allow the computers to be recharged while not in use.

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VIII. Budget Match

1. Attempted Budget Matches:

2. Actual Budget Matches:

3. Additional Budget Match information:

Our IT consultant recently informed us that 2 laptop carts which each hold 30 computers were recently sent to Surplus. She is going to check to see if those carts are still available. If they are, we would use those carts and this would reduce the cost of the project by $4000.