HENRY FORD COLLEGE
Technology Investment Fund (TIF)
Application for Funding

This form and any attachments must be submitted electronically to the chairperson of the Technology Investment Committee by the published deadline date. (This application may be submitted as a document separate from the attachments.)

Please read the Outline of Approval Process and Expectations of Applicants/Project Directors on the last page, and check the box stating that you agree to the terms of the expectations.

Date of Application: 09/21/2018	**Strategic Planning Initiative ID #:** 1675 and 1663
Project Name: Modernizing the Physics and Engineering Lab Experience	**Total TIF Funds Requested:** $67,120
Project Director(s): Paul Root, Jim Smith, Hassan Nameghi	**Department/Division/School:** Physics and Engineering, School of STEM

Summary of Project
(Please limit to one paragraph.)

This initiative seeks to provide Physics and Engineering students with modern laboratory equipment and technology commonly used by industry and 4yr institutions. Updating our laboratory equipment will provide students with new and enriched learning opportunities that our current equipment does not allow. This inititaive is requesting laptop computers, software, digital interfaces and accompanying laboratory equipment to update all of our Physics and Engineering laboratory courses.

Detailed Description of Project

Describe your project as specifically as possible. What do you propose to do, and why do you propose to do this?

We are requesting computers and equipment that will modernize the way we teach our Physics and Engineering labs. This initiative seeks funding for lab equipment that include probes and sensors to allow for digital data acquisition. Data would then be processed by students using computer software which allows for a more relevant learning experience. These systems allow for the measurement of accelleration, kinetic friction, impulse and momentum, conservation of energy, elastic collisions and harmonic motion to name a few. In addition to collecting and analyzing data, the computers can be used for simulations and modelling of experiments/activities (i.e. explosions) that cannot be safely performed in our facilities.

Student Impact

How many unique students will be served each academic year (Fall through Summer) by your project? "Unique students" refers to unduplicated headcount. Provide detail (course numbers, titles, and enrollments, for example).

Below is the list of courses this initiative will directly impact along with enrollment numbers from the 2017-18 academic year:

PHYS131 - General Physics I (enrollment = 290)
PHYS132 - General Physics II (enrollment = 88)
PHYS133 - Principles of Physics (enrollment = 76)
PHYS231 - Engineering Physics I (enrollment = 208
PHYS232 - Engineering Physics II (enrollment = 175)
ENGR130 - Introduction to Engineering (enrollment = 318)
ENGR205 - Digital Systems (enrollment = 55)
ENGR232 - Statics (enrollment = 45)
ENGR233 - Dynamics (enrollment = 52)

Project Relevance to Technology Investment Committee Guidelines
(Address only those that apply.)

Explain how the project provides technology to multiple courses or programs.

This laboratory equipment will be used across all Physics and Engineering lab courses. These courses include students in the Science Program, Chemistry Program, Pre-Engineering Program, and any other student selecting a Physics course in order to satifsy the MTA - Natural Sciences degree requiement.

Explain how the project introduces student access to technology where it has not been available.

This project seeks to change the Physics and Engineering laboratory activities for students. Students will be required to set up experiments with the correct equipment including the appropriate probes, sensors, digital interface and data acquistion software. Proper selection and placement of these components will need to work in concert to successfully execute an experiment, collect data, and perform an anaylsis. This approach will replace a number of exisiting activities that rely on manual measurements (ie. stopwatches, rulers, etc.) with a more sophisticated system. Students will gain experience with the increasing trend of integrating technology into experimental design, measurement, and data handling. This is a common industry practice and popular at 4yr institutions.

Explain how the project promotes innovation.

This project will help integrate technology into our Physics and Engineering lab curriculum. Converting many of our lab activities to digital data acquistion and analysis will help provide our students an enriched learning expeience that prepares them for a future in industry or 4yr school.

Explain how the project promotes curricular revision.

This project will alter the laboratory activities in our Physics and Engineering Courses. Lab activities will need to be revised to take full advantage of the increased capabilities that come with using equipment and computers that allow for automated data acquisition and analysis.

Explain how the project supports areas that have established themselves as leaders using technology.

This project will provide access to students in our Science, Chemistry, and Engineering Programs with equipment, software and computers that are commonly used in industry and 4yr schools. Having an opportunity to use this equipment is an enourmous benefit as these students progress on with their careers and/or education.

Are you pursuing additional funding sources? If so, what are they?

Alternative funding sources are not being pursued at this time.

Project Budget

What will be purchased? (Include model numbers, if appropriate.) What is the cost? Include amounts that are committed from funds other than the Technology Investment Fund, and indicate the source of those other funds.

This initiative requests the following:

1. Laptop computers (quantity = 14)
   estimated price: 14 x $1000 = $14000
2. Pasco Capstone Software (site licence)
   cat# UI-5406
   cost: $649
3. 850 Pasco Mechanics System - includes 850 Universal Interface (quantity = 14)
   cat# UI-5820
   cost: 14 x $3100 = $43400
4. 850 Pasco Mechanics System Experimental Manual - flashdrive
   cat# UI5813
   cost: $100
5. MultiSim Education software - 25 User License
   cost: $5941
6. Logic Design Trainer Kit (quantity = 10)
   cost: 10 x $300 = $3000

Where will funds for future maintenance needs, consumables, and such come from?

Ongoing support of this initiative will come from the annual operating Physics and Engineering budgets.

Forward any support for your budget (quotes, for example) to the chairperson of the Technology Investment Committee, and indicate here what has been forwarded.

I will be happy to obtain a quote for these items if needed by the committee.

Rank your needs so that the Technology Investment Committee will have guidance should only partial funding be available to recommend.

Rankings:

First Priority:
Laptop computers ($14,000)
Pasco Capstone Software ($649)

Second Priority:
850 Pasco Mechanics System - includes 850 Universal Interface ($29,400)
850 Pasco Mechanics System Experimental Manual - flashdrive ($100)

Third Priority:
Multisim Education software - 25 User License ($5,941)
Logic Design Trainer Kit ($3,000)

Project Location and Equipment Security

Describe specifically where items to be purchased will be located or installed. Forward to the chairperson of the Technology Investment Committee room-layout diagrams if appropriate.

When in use, the purchased items will be in rooms J-041, J-042, J-043 and J-044.

These items are modular systems that will be shared between these rooms depending on course offerings.

When not in use these items will be secured in the Physics Lab Prep. area which is locked and has limited access.

Indicate the status of any necessary approvals for using the space in which items will be located or installed.

This initiative does not require any special approvals for use of spaces. These will be used in existing lab space during regular class time.

Who, specifically, will do the installation?

The Capstone and MultiSim software and drivers for the digital interfaces will be installed on the laptops by our Physics Laboratory Assistant. Curricular redesign of the lab experiments will be performed by our FT Physics and Engineering faculty, Jim Smith and Hassan Nameghi.

How will equipment purchases be secured?

The laptop computers will be stored in a locked computer cart with not in use. Physic has a existing laptop cart available for this purpose. The digital interfaces and lab equipment will be stored in the Physics Lab Prep Area. This is a secured area that is locked and has limited access.

Have you discussed with the Executive Director of Facilities Services to determine what, if any, infrastructure modifications are required to support this project such as electrical upgrades, locks, etc.? What has been determined?

This project does not require any modifications to existing infrastructure.

Have you discussed with the Director of Network and IT Infrastructure to determine what, if any, software and/or network infrastructure modifications are required to support this project? What has been determined?

This project does not require any modifications to existing network infrastructure.

Evaluation

How, specifically, will you determine the success or shortcomings of your project?

This goal of this initiative is part of the College Strategic Plan to "achieve and sustain enrollment that ensures high-quality outcomes that meet the needs of students and industry". Should this project receive finding, our plan would be to full implement the new lab equipment, software and computers with the curricular changes for the start of the Fall 2019 semester. Time spent prior to the F19 semester will be used to pilot these changes with a smaller number of sections in order to troubleshoot any obstacles that arrise.

Success will be measured in the following ways:
1. Comparison of student comprehension and understanding. The level of comprehension will be assessed for students using our current equiment and compared to the level of comprehension of students using the new equipment. Rubrics will be generated for each of these assessments.

Analysis of the outcomes from these Rubrics will provide an opportunity to make adjustments to the laboratory activities to enhance student achievement.

2. Enrollment. Providing students with access to sophisticated and relavent technology as part of their Physics and Engineering laboratory experience will help maintain and attract students to these courses. Enrollment trends will be monitored to demonstrate the effectiveness of this initiative.

Monitoring changes in enrollment will identify the possible need for additional marketing and outreach.

TIF Funding: Outline of Approval Process and Expectations of Applicants/Project Directors

1. Your project must be consistent with the description of the purpose of the Technology Investment Fund (See II.D.210 in the Faculty Organization Handbook.) and must have been submitted as part of your division's operational plan. Assuming that your project has not been funded otherwise (from general College funds or through Perkins funding, for example), you may complete and submit the application for TIF funding by the announced deadline.

2. A meeting will be scheduled for you to present your project to the Technology Investment Committee. You will be asked to give a short presentation and to take questions from Committee members about your project. The Committee will then meet to determine whether to recommend funding for your project. Please remember that even projects with great apparent merit may not be recommended for funding due to limited funds or other factors.

3. The recommendations of the Technology Investment Committee are forwarded to the President for consideration. Should your project be recommended by the Committee for funding and should the President concur with that recommendation, the funding request is placed before the Board of Trustees for consideration.

4. If your funding request is to be brought before the Board, the Technology Investment Committee Chair will notify you of the date of the Board meeting at which your request will be discussed. You or someone familiar with your project should plan to attend that meeting to answer any questions Board members may have.

5. The Board of Trustees will not actually vote whether to allocate funds for your project until the meeting following the meeting at which your project is discussed. The Board generally does not ask further questions about projects during the meeting in which it takes the vote. The Technology Investment Committee Chair will notify you of the outcome of the Board's vote.

6. Assuming that the Board votes to allocate funds to your project, you will work with the Office of Financial Services and Auxiliary Services and with Purchasing to use your funding to complete your project. (A copy of your proposal will be forwarded to the Purchasing Director.) You are responsible for coordinating the work to be done to complete your project including any tasks required during the Spring and Summer semesters.

7. During the third full semester (Fall or Winter semester) following the semester during which your funding is awarded, you will be asked to provide a written report evaluating your project and to present this report to the Technology Investment Committee.

☒ I (We) have read the TIF Outline of Approval Process and Expectations of Applicants/Project Directors and do agree with the terms of the expectations.

Name(s): Paul Root, Jim Smith, Hassan Nameghi

Date: Sept. 21, 2018