2019-20 INVESTMENT FUNDS FULL APPLICATION ▶ #136

PROPOSAL SUMMARY

Project Lead Name	Markus Hoffmann
Project Lead email address	mhoffman@brockport.edu
Project Lead Division	Academic Affairs
Project Lead Department	Department of Chemistry and Biochemistry
Proposal Title	Making instrument computers of the Department of Chemistry & Biochemistry compatible for the 2020'ies

A. PROPOSAL DESCRIPTION

A-1. Describe the proposed project/initiative

Microsoft will stop support for Windows 7 and earlier operating systems by end of 2019, which means that Microsoft will stop providing security updates for these operating systems. In response to this development, LITS has already successfully upgraded the majority of the computers on campus to run on Windows 10. However, updates to Windows 10 could not be achieved for a number of instrument computers in our department because of outdated instrument specific software and/or instrument hardware incompatibilities. In addition, some of the instrument computers are outdated and replacement parts to repair potential computer hardware failures may soon not be readily available.

The proposal seeks support to achieve that all departmental instrument computers run on Windows 10 operating system. This will ensure cyber security of all instrument computers in the Department of Chemistry & Biochemistry and ensure uninterrupted availability of instruments for lab instruction and research activities in our department. The costs and associated technical details are summarized in the budget and justification.

Impacted by this proposal are all of our upper division laboratory courses, specifically organic chemistry courses CHM 305/306/341/342 with 140/90/5/5 students respectively; analytical/instrumental chemistry courses CHM303/313/416/423 with 15/50/5/10 students; Physical chemistry courses CHM 408/409 with 10 students each; inorganic chemistry courses CHM303/432 with 20/5 students, and biochemistry courses CHM 407/470 with 10/20 students.
In addition, all department faculty are actively supervising undergraduate students in laboratory research for independent study (CHM 399/499) and summer research. Moreover, our instruments are also serving research activities in other departments (recently Dr. Ortega, Biology and Dr. Smith, Earth Sciences) and external users, most notably Dr. Jack Fox, who has an agreement with our department through the Research Foundation to use our instruments and lab space for his consulting business "Counterparts" for a negotiated user fee in return.

The following summarizes the impact on our departmental courses and research by instrument:

A total of four chromatography instruments require new software and/or hardware: two gas chromatography (GC) instruments affecting CHM 305/306/303/313/341/342 and the research of Drs. Logan, Reed, Smith, one GC with mass spectroscopy detection (GCMS) affecting CHM 303/313/341/342/416) and the research of Drs. Reed, LeSuer, Hoffmann, and one liquid chromatography instrument (LC) affecting CHM 303/306/313/416 and the research of Dr. Hoffmann.

Software up-grades are also needed for our ultraviolet-visible (UV-vis) spectrophotometer (CHM302/303/313/408/409/407/432/470, Drs. Blose, Heitz, Hoffmann, Logan, Reed, Smith) and for our fluorescence spectrometer (CHM 407/416/432/470, Drs. Blose, Heitz, Reed).

Our nuclear magnetic resonance (NMR) spectrometer requires hardware upgrades (CHM 305/306/408/409/423, Drs. Heitz, Hoffmann, Logan, Reed, Smith).

Our time-resolved fluorescence spectrometer is dedicated for the research of Dr. Heitz. He obtained the instrument in 2006 through an NSF grant, which since then generated data disseminated in more than ten journal articles. Here, significant software and hardware up-grades are necessary that will have to be done in large part by the manufacturer in Scotland.

In summary, the requested funds will address unanticipated challenges in completing the campus wide Windows 10 upgrading initiative.

B. TYPE OF FUNDING

B-1. What type of funding have you been invited to apply for?	**Core Needs, Facilities & Alterations -** to provide one-time temporary funds to support pressing unbudgeted or under-supported academic/operational/administrative needs, facilities and alterations, and initiatives that build long-term capacity, such as staff development, investment in infrastructure, and risk management initiatives.

B-2. Applications for <u>Strategic Priorities</u> funds must indicate which ONE of the following measures of success the project/initiative addresses:

C. STRATEGIC ALIGNMENT

C-1. Outline the ways in which the proposed project will contribute to the College Strategic Plan, and the specific Measure of Success you selected in question B-2.

Your narrative must:
(1) Identify the measure of success you selected in question B-2 above, and
(2) Be explicit in describing *how* the project contributes to that measure.

D. OBJECTIVES & ASSESSMENT MEASURES
Successful applications must include well-defined assessment plans that include clear measurable objectives and specify the measures/data that will be used to determine if each objective has been met.

D-1. Short-term Goals/Objectives:
What measurable goals or objectives do you hope to achieve with this project in the short-term, meaning within the one-year time frame for which funds are available (fiscal year 2019-20)?
The goals are to
- Complete in collaboration with LITS implementation of Windows 10 on all instrument computers of the Department of Chemistry & Biochemistry before the end of 2019 when Microsoft will stop supporting older operating systems.

- Minimize disruptions of teaching and research activities during Windows 10 implementation on instrument computers in the Department of Chemistry & Biochemistry

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D-2. In the previous question, you identified the measurable short-term objectives you hope to achieve with your project. For <u>each objective</u> listed, explain what measures or data you will use to determine if that goal has been met.

We are thankful that since Fall 2018 we are having with Michelle Friedman a new staff member in our department who, as part of her work program, serves as our instrument technician. She will assist the Project Lead in overseeing the implementation of the Windows 10 instrument up-grades working in collaboration with LITS personnel and department faculty. She will keep a journal to keep track of the implementation progress. In particular, she will keep track of order placements, software and hardware order deliveries, timing decisions on implementation, soft/hardware installation procedures including any specific information that could be valuable for future reference, testing of instrument functions after soft/hardware installation, and any unexpected difficulties and resulting disruptions to teaching and research activities. A summary of these journal entry data and potential lessons learned that could be useful to other campus entities will be the basis of the required 6-months report and final report. In fact, by continuously journaling implantation progress, we will be able to quickly assess at any point in time the completion status and the number of disruptions that may have occurred.

D-3. Long-term Goals/Objectives:
What measurable long-term goals or objectives (if any) do you hope to achieve with this project in the long-term, meaning beyond the one-year time frame for which funds are available (fiscal year 2019-20)?

The proposed activities are preventive in nature. The requested funds will support proactive actions to avert threats to the cyber security on our campus as well as threats for disruptions to teaching and research activities in the Department of Chemistry and Biochemistry. Aversion of these threats is in essence the major underlying long-goal of this proposal for the campus. The success of achieving this goal can be assessed at time intervals beyond the 1-year award period. In this regard, in collaboration with LITS, we are committed to record any security breaches as well as disruptions to our teaching and research activities in the years to come that are due to insecure or failing instrument computers in our department. If none such incidences happen, we will have succeeded in achieving our long-term goal. If such incidences do happen, then our department is committed to continue our excellent working relationship with LITS to find additional strategies and measures to address the incident causes.

E. IMPLEMENTATION PLAN

E-1. Identify the specific activities to be funded from the Investment Fund along with an estimated timeline for implementation. All activities and expenditures must occur within the stated one-year period of fiscal year 2019-20.

By April 1: Award notification
by July 1, 2019: Receive any needed updated quotes and work with procurement department in preparing purchase orders so that purchasing can commence immediately upon new 2019/20 budget year.
By July 15, 2019: Place all purchase orders for new computers. From recent experience, delivery of computers may take up to two months.
By Aug. 1, 2019 Place all purchase orders of software and hardware components.
By Oct. 1, 2019: Finalize coordination of software/hardware installations to minimize impact on teaching and research activities. Begin installation of software and hardware that are being received. Ship components including new instrument computer of the time-resolved fluorescence instrument to vendor in Scotland.
By Dec. 15, 2019: Complete all software/hardware installations before the Christmas break.
By Jan. 1, 2020: Submit 6-months report.
By July 1, 2020: Continue monitoring for security breaches as well as disruptions of teaching and research activities due to instrument computer failures or malfunctions. Submit final report.
Beyond July 1, 2020: Continue monitoring for security breaches as well as disruptions of teaching and research activities due to instrument computer failures or malfunctions.

F. CONSULTATION & AUTHORIZATION FORMS

F-1. This proposal includes (check all that apply):

F-2. For requests involving technology. The Chief Information Officer (Bob Cushman or his designee) has reviewed this proposal.

✔ Yes - please attach the signed Technology Consult Form in section F-4 of this form.

F-3. For requests involving alterations of facilities, the Vice President for Administration & Finance (Jim Wall or his designee) has reviewed this proposal.

✔ Not Applicable

F-4. Upload the signed Technology and/or Facilities Consult Form(s) here.

📎 SignedIFTechConsultFormMMHFilled.docx

G. BUDGET

G-1. Upload your itemized budget here. Use the Excel Budget Spreadsheet sent to you in your notification email.

2019-20 Investment Fund Budget TemplateFilled out.xlsx

G-3. Please provide a narrative explanation for your budget. Provide further detail than what is included in the spreadsheet and offer a justification for expenses.
Budget justification

• NMR instrument
From all the instruments in our department, the NMR instrument has the most sample throughput from teaching and research activities in our department. Only line items 1, 2, and 4 of the quote for the NMR instrument upgrades apply amounting to $6,576. However, we note that cost savings in excess of $9,000 are realized by installing the instrument software ourselves in collaboration with LITS on a campus owned computer.
We also note that a purchase of a new NMR instrument is about $250,000 and will likely become necessary within the next five years. Conversely, the up-grades will help prolonging the lifetime of the current instrument to these precious additional years. This buys us time to develop a strong proposal with involvement of anticipated hires of a new biochemist (current search) and organic chemist (anticipated search to replace Dr. Jessica Smith who has not put forward her renewal package) to the Major Research Instrument program of the National Science Foundation, the only external funding source for such instrumentation purchase we are aware of.

• UVvis spectrophotometer
Our UV-vis instrument is used by a large number of courses and the majority of our faculty use it for their research. The obtained quote from Perkin-Elmer is for new software license that is needed to up-grade to Windows 10.

• Gas Chromatography (GC) instruments
We are fortunate to possess three GC instruments for our teaching and research mission. Two of these use flame ionization detection, while the third one uses the much more

powerful methods of mass detection, thus making this GC instrument more expensive (~$130k vs. ~$60k). The instruments support a large number of our upper division courses and the research of multiple faculty members. Our GC instruments are all manufactured by Agilent. We thus have no choice but acquiring from them the needed newer software that controls these instruments. Unfortunately, Agilent is pricing their Windows 2010 software very high at about $5,000 per instrument. In addition, the older of the two instruments requires also hardware up-grades of about $9,000 to ensure that the automation hardware is compatible with new Windows 10 compliant software. One could omit this cost, but then the instrument could only be used with single, manual injection, which would be a severe limitation.

• High Performance Liquid Chromatography (HPLC) instrument
The HPLC instrument supports four upper-division courses and the research of one faculty member. The obtained quote from Shimadzu covers the cost of a new Windows 10 compatible software license.

• Fluorimeter
The instrument is used in our specialized upper-division laboratory courses with low enrolments. The instrument does support the research of several of our faculty. The obtained quote from Perkin-Elmer covers the cost of purchasing a new software license that is compatible with Windows 10.

• Time resolved fluorescence spectrometer
This instrument is used for research by Dr. Heitz. It is an essential piece of equipment for his laboratory research. The costs for addressing the Windows 10 upgrade are so high for several reasons. First, for this equipment both hardware and software upgrades are required. To change the software, a new computer is required but because the computer must be synchronized to the specific individual hardware, all components must be programmed directly by the manufacturer. The upgrades can only be done by company technicians in their facilities in Scotland. Thus, instrumentation and computer must be shipped to/from Scotland. Second, since the original purchase in 2012, the existing electronics that control the instrumentation have been phased out and replaced with a newer model. Therefore, we cannot simply upgrade the existing computer software as the existing computer will not properly interface and communicate with the hardware. However, the good news is that the upgraded electronics and computer will continue to work with the base instrument (additional cost of ~$55,000 if it were to require replacement). The enclosed quote from Horiba Jobin Yvon, Inc. provides further technical details.

• New instrument computers
While in principle Windows10 could be installed on the present computers controlling the instruments, we propose to replace these aging computers and purchase a total of 8 new computers for these instruments. This will significantly lower the risk of instrument computer failure and associated disruption of laboratory teaching and research. Rounding current Standard Desktop state contract rate of $775.84 to $800.00 to account for possible inflation, the total is $6,400 for 8 computers.

G-4. Does your budget include an application for an internal loan?   No

G-5. Please explain why the proposed project cannot be self-funded from existing Department, School or Division resources.
The scope and dollar amount of the Windows 10 implementation project far exceeds budget resources of our department and even of our School. Speaking for our department, we would be willing to contribute to the project costs on the order of a few thousand dollars, but we can definitely not stem the total costs of the project. We'd be happy to discuss any further questions and to brainstorm any other ways to achieve that our instruments will become Windows 10 compatible and ready for the 2020'ies.

H. ADDITIONAL INFORMATION

H-1. Use this space to provide any additional information to assist in the review of the proposal.
The filled out budget template sheet also lists the quoted costs for each instrument up-grade along with impact on teaching and research listed by course and faculty. The actual

quotes are included as supplementary materials

We would like to provide additional remarks explaining how the proposal aligns with the College's strategic goals.

The proposal supports Goal 1: To be a great College at which to learn because our upper-division laboratory courses seek to provide our students training and skill development in working with widely used lab instrumentation and equipment. These instrument skills are essential to our students to succeed in STEM-related employment and continuing education at the graduate level.

Moreover, all of our faculty are actively supervising undergraduate students in laboratory research for independent study (CHM 399/499) and summer research, which are well recognized HIPs & CHIPs. For example, during 2017/18 academic year a total of 24 students were supervised for a total of over one hundred contact hours. Therefore, ensuring that our instruments are ready for the 2020'ies applies to Strategic Priority 1.5: Ensure that all undergraduate students, including transfer students and non-traditional students, have the opportunity to undertake multiple HIPs & CHIPs & have these experiences identified on their academic & co-curricular transcripts.

We remark that this proposal also addresses to some extent Strategic Priority 2.1 and 2.6 because our instruments are also serving research in other departments as well as the local consulting business "Counterparts" of Dr. Jack Fox.

Upload up to 3 supplemental files here.	Bruker_Horiba.pdf Agilent.pdf Shimadzu_PerkinElmer.pdf

Project Lead Signature

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