PSME
Equipment Request
2016 – 2017 Academic Year

PSME Total Equipment Request: $120,950

Chemistry:

1. What are you requesting?

$ 6,000: Dry Ice Maker; required for rotary evaporator functionality. At this point the solvents are being evaporated using 48 hour air drying methods which are obsolete, waste valuable learning time, and do not reflect current industry practices.
$ 7,500: Microcentrifuge (3); currently we are using microcentrifuges that are approximately 40 years old and are no longer functioning. These centrifuges need to be replaced with modern centrifuges that will work more efficiently.
$ 15,000: Microplate Reader; used in Chem 1 sequence; replaces 40 year old device which is obsolete, no longer working well, and does not reflect modern chemical industry standards.

$ 28,500: Total Chemistry request

2. How many students will benefit from this purchase?

There are 10 different chemistry lab courses with 30 lab sections per quarter that would benefit from this equipment - approximately *3500 students annually*

3. How does this enhance your Equity Goals?

The primary equity goal is to provide all students an educational experience that enhances students' understanding of the theoretical concepts discussed in lecture. Hands on experiments provide an additional learning mode that widens the modes of instruction and provides learning opportunities for a wider range of students. It also connects more abstract theory to the real physical environment experienced by students. Chemistry laboratory courses satisfy GE lab science requirements and support several Career and Technical Education programs.

4. How does this enhance your Student Learning Outcomes?

All chemistry course SLO's include an objective related to the laboratory component of the class. To satisfy these SLO's students need to engage in experimental protocols that employ the requested reagents, materials and supplies.

5. Was this noted on your Program Review?

Yes, all these items have been listed in our program review document. The items are of high urgency to the lab programs.

Engineering:

1. What are you requesting

$ 14,000: Standard Laptop Computers (8); Dell E7470 laptop computers to be used in engineering group workstations in S48. They will be used for engineering projects and laboratories in Engr 10, 35, and 37 classes. These computers would also replace current obsolete desktop that are literally on top of desks and obscure view, making instruction in S48 more difficult.
$ 3,400 Robotics Kits (4); these robot kits provide students with all materials required for engineering projects that are compatible with standard Engineering 10 curriculum at target transfer institutions; robot projects are reusable and flexible and can be changed from quarter to quarter.

$17,400: Total Engineering request

2. How many students will benefit from this purchase?

Approximately *3500 students annually* take engineering 10, 35, and 37 classes that would use these computers

3. How does this enhance your Equity Goals?

The engineering department has made significant strides in improving student success and equity, and currently has the lowest equity gap in the Division. Part of this success has been due to the recent incorporation of hands on laboratory experiments and student design projects that allow students to more directly connect theoretical aspects of engineering with their personal knowledge and experiences. The experiments and projects allowed with this funding will provide additional learning experience that widens the mode of instruction and provides deeper engagement and learning opportunities for a wider range of students.

4. How does this enhance your Student Learning Outcomes?

Engineering course SLO's include a component requiring the analysis, design, and building of useful systems, and the requested materials will help meet those objectives. Student engineering class projects encourage socially responsible solutions to common technology problems selected by students, thus further enhancing department SLO's and the College mission.

5. Was this noted on your Program Review?

Yes, both the computers and equipment and supplies needed to implement and demonstrate successful completion of an engineering project were requested.

Geology:

1. What are you requesting?
$9,200: One MacPro Computer + Peripherals + Apple Care; single high end computing system required to handle large imaging and visualization data sets. Current computer is no longer able to keep up with updates, software, and increasing need for processing power and storage.
Cost:

$ 9,200: Total Geology request

2. How many students will benefit from this purchase?
All students in the Geology program approximately *700 students annually*, including all students in Geology 10 and Geology 20, will benefit from the use of real data in the classroom. We have laptops for student use, and need large datasets cut and preformatted so the students can work with the processed data. Additionally students in the Astronomy laboratories will use data sets that have been processed on this computer and lectures of Astronomy include images generated from processing on this computer. Including the astronomy students who will benefit, the equipment will benefit about 2700 students annually.

3. How does this enhance your Equity Goals?
The primary equity goal is to provide *all* students an educational experience that enhances students' understanding of the physical world around them. In class experiments and field trips provide a learning experience that widens the modes of instruction and provides learning opportunities that appeal to a wider range of students. The requested equipment further enhances these learning modes by allowing students to collect and view real geological, oceanographic, and astronomical data. The resulting visualization provides an alternative way to understand earth science concepts, and deepens the engagement and understanding of all students. Geology laboratory courses satisfy GE lab science requirements and are an accessible and popular way for students to meet these general education requirements.

4. How does this enhance your Student Learning Outcomes?
Listed below are some of the geology course SLO's which require students to utilize the scientific method to form hypotheses from real data and observations. The requested computer system allows for the collection and preparation of data in a format that can be analyzed by students and used by them to demonstrate they have been able to form reasonable hypotheses.

1. Apply the principles of scientific methodology to test hypotheses on how the Earth works as an integrated system.
2. *Use data and observations* to track and predict changes in the Earth system resulting from dynamic Earth Processes.

3. *Use observations* from the crust and lithosphere of the Earth to determine geologic history at hand sample, outcrop, local, and regional scales.
4. Apply scientific methodology and geologic principles *to analyze the impact* of the Earth system on humanity, from specific natural hazards and the availability, use, and distribution of Earth resources.

5. Was this noted on your Program Review?

This equipment was referred to in our current program review and was on our list for Spring 2016 consideration.

Mathematics:

1. What are you requesting?
$ 10,500 Standard Laptop Computers (6); 6 Dell E7470 computers to be used in S41 Math Performance Success (MPS) tutorial area to support MPS students.
$ 26,250 Standard Laptop Computers (15); 15 Dell E7470 computers to be used in computer labs for use by all math classes. Mathematics classes are increasingly making use of software based learning and visualization systems, and students need increased access to these tools. In addition, laptops enable dual use of classrooms for both lecture and computer lab components of the course.

$ 36,750: Total Mathematics request

2. How many students will benefit from this purchase?
The MPS tutorial computers would benefit between 9 to 14 sections of students per quarter (the program is scheduled to increase significantly in the coming year) and so would serve around *1000 to 1500 students annually*. These are students who have the greatest need of academic support, and the MPS program (including the tutoring component) has had a very significant demonstrated positive impact on their success. The MPS students were previously served by the tutorial center and its computer facilities but, due to a reorganization, are no longer offered those services – hence the need for the additional computers in a new MPS tutorial area.
The other mathematics laboratory computers (in conjunction with current computers) could serve a potential population of *over 26,000 students annually.*

3. How does this enhance your Equity Goals?
These requests will enhance our efforts to improve equity by providing learning tools to students in special programs (MPS and Statway) with the demonstrated ability to enhance student success and equity. The computers will provide students, who often have great financial need, resources which are commonly available to other students. The MPS program has a success rate very significantly above that of traditional math courses and has an equity gap of near 0% (compared to a 16% equity success gap for other math courses). The general math lab computers also provide access to computers for those with financial constraints. Greater computer access will also allow students to visualize mathematical concepts and to "play" with mathematical constructs in an interactive manner. This will provide a wider range of learning modes and will reach students who might otherwise not respond to lecture models of learning.

4. How does this enhance your Student Learning Outcomes?
All math class outcomes include requirements involving computation and mathematical visualization and communication through charts and graphs. The computers and software provide necessary tools that enhance the achievement of these SLO's. Use of laptops also improves the classroom environment by allowing instructors to move

smoothly between lecture and lab modes – in current labs, the large screens hinder line of sight between instructor and student, whereas the laptop screens can be folded down when not in use.

5. Was this noted on your Program Review?

The request for new laptops in the S4 math computer labs was cited in our current program review. The need for MPS tutorial computers only became apparent after the program review had been completed. A reorganization of the tutorial center which resulted in the separation of tutorial support services for MPS students to a new, independent facility necessitated the request for six additional computers.

Physics:

1. What are you requesting?
$ 12,000: Agilent Function Generators (10); replacement of obsolete and broken generators used in all physics labs. This equipment is a key component in many standard physics labs in several physics series. The current generators are more than 15 years old, and so many are broken that it has become difficult to do many common experiments.
$ 1,500: Pasco Timers (5): these timers are used in many different physics classes and are fundamental to making laboratory measurements. Again, many of the current timers are broken and need to be replaced.
$ 1,200: Cables (100); a wide assortment of electrical cables are needed to replace lost or broken cables needed for physics experiments. Again, there has not been a significant update of physics lab equipment to replace critical broken and lost materials in about 15 years.
$ 14,400: Computer lab interface system; includes computer interface equipment such as probes and digital measurement devices used to directly acquire lab data in mechanics, electricity, and modern physics experiments and to analyze and graph the data. Students need to learn to use modern methods of data acquisition and analysis, which is not currently possible without these interfaces.

$29,100: Total Physics request

2. How many students will benefit from this purchase?
These materials would be used by all physics lab sections. Approximately *2000 students participate annually in labs using these items.*

3. How does this enhance your Equity Goals?
The primary equity goal is to provide all students an educational experience that enhances their understanding of the theoretical concepts discussed in lecture. Hands on experiments provide an additional learning opportunity that widens the modes of instruction and provides deeper and more engaging understanding for a wider range of students. It also connects more abstract theory to the real physical environment experienced by students. Physics laboratory courses satisfy GE lab science and are open to the widest range of students. The requested equipment is absolutely essential to the laboratory experience.

4. How does this enhance your Student Learning Outcomes?
All physics course SLO's include an objective related to the laboratory component of the class. To satisfy these SLO's students need to engage in experimental protocols that require the requested equipment. The department has not replaced obsolete, broken, and lost equipment for many years, and the current request is essential to maintain a viable lab experience.

5. Was this noted on your Program Review?
Yes.