

INSTRUCTIONAL EQUIPMENT REQUEST

2018-2019

SEP 13 2018

Internal Use

IE #: Fall-31
Total \$: _____

Requester Name: Andrew Lozano & Eric Harpell Division Name: STEM

SUMMARY INFORMATION

Title of Item: New Equipment to Expand Physics Labs

Equipment Location Building: 1800

Room: 1831

Location Comments:

SECTION 1: EQUIPMENT DESCRIPTION

The equipment is: ☒ A Replacement ☐ An Upgrade ☐ New Equipment/Technology

Describe the specific equipment requested and how it will be used to replace, upgrade or provide new technology to LPC from what is currently in place:

The physics department has steadily grown over the past four years. In Spring 2017 we had 183 students enrolled. This is a 60% increase in enrollment from 2014 (program review, 2017). This increase has required the department to add courses and increase lab sections each semester. As well as general increased enrollment, a new Lab section, Phys 10L, has been created to better serve the engineering cohort. With the addition of lab sections, 1831 (Lab Space for physics) is now encountering scheduling conflicts. A solution to this is to open the engineering Lab, 1822, for some physics labs. However, the engineering lab is not equipped with some of the necessities required for proper physics labs. This is equipment request will allow rooms 1831 and 1822 to operate as separate physics lab rooms with minimal equipment conflicts.

Our basic optical equipment for Physics 1B has become worn and non-functional over the many years it has been in service. The optical kits we have are now longer supported by Pasco or any other company, and therefore, need to be replaced with new generation made available by Pasco.

Equipment List:

Replacement Optics:

Basic Optics System-

optics and table ray optics investigations..

Precision Diffraction Slits-

Equipment for Physics Lab annex

Variable Output Air Supply

the air flow to the experiment

Air Track Accessory Kit

Projectile Launcher

good launcher not only illustrates this non-intuitive idea, but it can be used to describe the exact motion of the projectile as well.

Large Table Clamp

to 12 mm diameter rods that can be mounted either horizontally or vertically. Large threads and easy-to-turn handles allow a tight hold in almost any situation.

Spherical Mass Set

Replacement Rod for Dual-Range Force Sensor

Ultra Pulley

LPC - RECEIVED

SEP 28 2018

ADMINISTRATIVE SERVICES

Vender	Product ID	Product	Description	Unit Price	Qty	Price	% of total
Pasco	OS-8515C	Basic Optics System	PASCO's Basic Optics System is easy to use, affordable, and ruggedly designed for both geometric bench optics and table ray optics investigations.	\$495.00	8	\$ 3,960.00	16.3%
Pasco	OS-8453	Precision Diffraction Slits	Includes two slit wheels allowing students to examine various diffraction patterns	\$210.00	8	\$ 1,680.00	6.9%
Pasco	SF-9214	2.0 m Air Track	An air track glider provides the raw material for highly accurate investigations into the laws of motion.	\$750.00	8	\$ 6,000.00	24.7%
Pasco	SF-9216	Variable Output Air Supply	Must go with Air track. The PASCO Air Supply is exceptionally quiet. Its variable output lets students match the air flow to the experiment	\$530.00	8	\$ 4,240.00	17.5%
Pasco	SF-9295	Air Track Accessory Kit	This accessory kit comes with every PASCO Air Track. All that's needed is a timing system. The set may also be ordered separately.	\$ 20.00	8	\$ 160.00	0.7%
Pasco	ME-6800	Projectile Launcher	The Projectile Launcher illustrates the idea that motion in different dimensions is absolutely independent.	\$365.00	8	\$ 2,920.00	12.0%
Pasco	ME-9472	Large Table Clamp	PASCO's Large Table Clamp can attach to tables, shelves or other boards up to 10 cm thick.	\$100.00	12	\$ 1,200.00	4.9%
Pasco	ME-8968	Spherical Mass Set	This spherical mass set includes four balls with a diameter of 25 mm each, but featuring various masses and rotational inertias	\$ 60.00	8	\$ 480.00	2.0%
Pasco	SE-8759	Hooked Mass	This rugged Hooked Mass Set is made from cast-iron and coated with enamel.	\$ 55.00	8	\$ 440.00	1.8%
vernier	ACC-ROD	Rod for Dual-Range Force Sensor	Accessory for pulley	\$ 4.00	15	\$ 60.00	0.2%
vernier	SPA	Ultra Pulley	Add an Ultra Pulley to your Photogate to monitor motion as a string passes over the pulley, or as the pulley rolls along a table	\$ 24.00	15	\$ 360.00	1.5%
vernier	VPG-BTD	Photogate	Photogate to monitor motion	\$ 45.00	15	\$ 675.00	2.8%
vernier	MD-BTD	Motion Detector	The Motion Detector uses ultrasound to measure the position of carts, balls, people, and other objects	\$ 79.00	4	316	1.3%
vernier	DFS-BTA	Dual-Range Force Sensor	The Dual-Range Force Sensor is a general-purpose sensor for measuring pushing and pulling forces.	\$109.00	4	\$ 436.00	1.8%
vernier	LABQ2	LabQuest 2	Vernier LabQuest 2 is a standalone interface used to collect sensor data with its built-in graphing and analysis application	\$329.00	4	\$ 1,316.00	5.4%
						\$ 24,243.00	100.0%

SECTION 1: EQUIPMENT DESCRIPTION (contd)

If applicable, describe the legal requirement, mandate, or safety concern for purchase of this equipment, making specific reference to the legal requirement or regulation:

There are no safety concerns for the purchase. All equipment on the order are safe and already is used in the lab room.

SECTION 2: LPC MISSION STATEMENT AND LPC PLANNING PRIORITIES

LPC MISSION STATEMENT:

LPC is an inclusive learning-centered institution providing educational opportunities and support for completion of students' transfer, degree, basic skills, career-technical, and retraining goals.

LPC PLANNING PRIORITIES:

- ❖ **Accreditation:** Establish regular and ongoing processes to implement best practices to meet ACCJC standards.
- ❖ **Curriculum:** Provide necessary institutional support for curriculum development and maintenance.
- ❖ **Tutoring Services:** Expand tutoring services to meet demand and support student success in Basic Skills, CTE, and Transfer courses.
- ❖ **Professional Development:** Coordinate available resources to address current and future professional development needs of faculty, classified professionals, and administrators in support of educational master plan goals.

Specify how the equipment supports *LPC's Mission Statement and Planning Priorities:*

Physics 10L, the Extended lab for engineering cohort, provides educational opportunities and supports basic skills, career-technical, and retraining. The equipment will be used by the cohort as well as the Engineering and Physics student body that have goals towards Transfer Degree.

The new equipment is necessary to support the revised curriculum of Physics 10L's development, as well as, maintenance and replacement for old or damage equipment.

In order to meet and implement best practices of the ACCJC standards, updated equipment is need. Currently, the optics labs are in need of a revamp because the equipment is no longer supported by the company and has become worn, broken, or missed placed.

SECTION 3: EDUCATIONAL ITEMS – PROGRAM REVIEW

Specify the educational programs this equipment supports:

Physics 1 Series, mainly: 3 sections of 1A and sections 1B;
Physics 2A & 2B
Physics 10L

If this equipment is included in your Program Review, please include the exact wording. If equipment is not included, explain why:

Specific equipment is not included in the Program Review, however the need for greater lab space is reported:

"As described above, we have been experiencing increased enrollment in our physics classes as the college grows. We have had increasing difficulty scheduling our twelve 3-hr lab classes inside our single physics lab classroom (rm 1831). Somedays, the lab room is in constant use from 8am to 10:30pm and it's becoming very difficult to schedule our long lab classes without conflicting with other math/science courses. Consequently, we have a great need of an additional physics lab room. 1822, conveniently next door to both the physics lab room and the equipment storage area, is currently being used as the engineering lab room. However, it is in use infrequently. In the short term, hosting some physics labs there should work. As both the engineering and physics programs grow, however, this will also become unsustainable. It is also not an ideal arrangement in terms of space, because both engineering and physics labs require lots of different equipment. Engineering equipment in particular tends to be larger and not portable.

A much better option would be having at least 2 lab rooms designated for physics and astronomy labs. The 1826 room (currently used as a lecture room) was originally designed to become an additional lab room when program needs required. Use of this room as a lab room would greatly help the program. Of course, this would require extra lecture space to replace the 1826 room, which is frequent use."

The need for expanding space came before deciding what lab would be place in the space, room 1822. The department is confident that this new equipment will supplement and ease pressure from 1831.

SECTION 4: TEACHING AND LEARNING

Describe in detail the impact this equipment will have on teaching:

The department will be able to run 2 physics labs at the same time without continuously interrupting each other. This will provide the instructors the tools they would need to run a proper lab.

Describe in detail the impact this equipment will have on learning:

The majority of our labs have moved from Lab-Manual instruction to inquiry based learning. Essential to this method is the need for the lab room and equipment to become modular, that is to say, equipment must be on "stand-by" ready to be used upon the request of the inquisitor (the student). It is therefore necessary to have another set of equipment in the new room.

Each academic year, this equipment will impact: 6 # of classes/sections 180 # of students

SECTION 5: OUTCOMES (SLOs)

Using your documented SLOs, specify how the equipment will enable student learning outcomes to be achieved.

Upon successful completion of an AS in Physics, students are able to analyze physical situations quantitatively using fundamental physics principles, ranging from Newtonian mechanics to modern physics.

The air-tracks with accessories, Projectile Launcher with Accessories, and optical kits support this outcome.

Upon successful completion of an AS in Physics, students are able to design and conduct laboratory experiments, and analyze and interpret their data.

The method of inquiry based labs means that students design their own experiments with lab equipment in the room.

What are the consequences related to learning outcomes if request is not funded?

As stated above, Optics is in great need for new equipment. If we don't have new sets of optics the student will have to continue to share optical components, creating an inefficient and halted learning environment.

Currently, 1822, operates solely as an Engineering room; no equipment for physics experiments are in the room and constantly transporting the type of equipment we wish to purchase will cause damage to the already greatly worn equipment we have.

SECTION 6: TOTAL COST OF OWNERSHIP (FINANCIAL & SUSTAINABILITY)

What is the potential life span of the requested equipment?

10-15year

If new storage is needed what are the storage requirements, location requirements, and costs associated with the new equipment: (NOTE: Specific storage costs should be detailed in the “Part A: Initial Start-up Costs” section below.)

No additional coast will be needed for storage

If this equipment replaces old equipment but the old equipment will not be retired, are there on-going storage requirements, location requirements, and costs associated with the old equipment? If so, provide details.

That items that are being replaced, mainly the optics (but also air tracks), with be kept as spare equipment. No cost associated with old equipment

What will be required to maintain the equipment, such as regular servicing or upkeep? (Specific on-going costs should be detailed in the “Part B: On-Going Annual Operating Costs” sections below as applicable.)

N/A

Explain how this equipment meets or exceeds basic sustainability efforts and/or provides renewable resources to the college:

Some of the equipment, including Logger-Pro units, mass sets, and table clamps will be used in a future EVST 5 Lab that is currently under development. As well, air tracks, air pumps, and optic kits use less power than existing systems and therefore will represent a small decrease in campus power use meeting the basic sustainability effort.

SECTION 6: TOTAL COST OF OWNERSHIP (contd)**Part A: Initial Start-up Costs**

<u>Item</u>	<u>Cost</u>	<u>Comments</u>
Equipment or Materials	24,243.00	
Taxes (9.5%)	2250.46	
Shipping or Delivery Charge	100 approx	
Installation Costs *		
Miscellaneous Costs:		
Facilities Modifications		
Operator Training		
Maintenance & Repair Training		
Storage		
Other: _____		
Vendor Discount		
Grand Total:		26,646.1

*For items requiring installation, requesters are required to check with District Purchasing (Victoria Lamica) regarding District policies.

Part B: On-Going Annual Operating Costs

<u>Item</u>	<u>Cost</u>	<u>Comments</u>
Annual Service or Maintenance		
Estimated Parts Replacement Per Year		
Outside Standardization or Calibration Costs		
Storage Costs		
New Supply Costs		
Miscellaneous Costs:		
Maintenance & Repair Labor		
Other: _____		
Annual Operating Costs:		0

Indicate the source of funding for on-going annual operating costs:

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SECTION 6: TOTAL COST OF OWNERSHIP (contd)

Part C: Incremental Labor Costs

OPERATOR:

Indicate the key operator: Lab Tech / Student

Is this in their current scope of duties? Yes

Indicate cost to train key operator (include in Initial Start-up Costs above): 0

Indicate amount of time per month key operator will use equipment: 2 / month

MAINTENANCE & REPAIRS:

Indicate the person performing maintenance and repairs: b Lap Tech mlt

Is this in their current scope of duties? Yes

Indicate cost to train for maintenance and repairs: 0

Indicate amount of time per month maintenance will be required: 0

APPROVALS

Funded requesters will be expected to respond to a brief RAC feedback survey by a requested deadline. Requests for computer-related equipment and printers must be reviewed by the LPC IT Department.

Signatures:

[Signature]

Requester

9/12/2018

Date

IT Department (if required)

Date

[Signature]

Dean/Manager

9-14-18

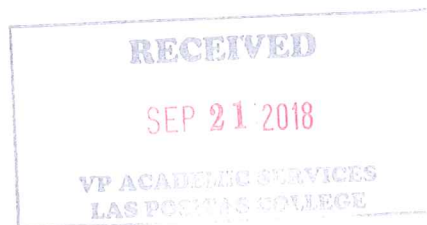
Date

[Signature]

Vice President

9/21/18

Date





YOUR CART



CONTINUE SHOPPING

Your cart

VIEW WISH LIST

Cart Help

Cart ID: 2562901

Date: 09-12-18

Customer ID: 14045152

Description	SHOW DETAIL	Qty	Price *	TOTAL
▶ OS-8515C	Basic Optics System	8 Remove ACTIONS	\$495.00	\$3,960.00
▶ OS-8453	Precision Diffraction Slits	8 Remove ACTIONS	\$210.00	\$1,680.00
▶ SF-9214	2.0 m Air Track	8 Remove ACTIONS	\$750.00	\$6,000.00
▶ SF-9216	Variable Output Air Supply	8 Remove ACTIONS	\$530.00	\$4,240.00
▶ SF-9295	Air Track Accessory Kit	8 Remove ACTIONS	\$200.00	\$1,600.00
▶ ME-6800	Projectile Launcher	8 Remove ACTIONS	\$365.00	\$2,920.00
▶ ME-8968	Spherical Mass Set	8 Remove ACTIONS	\$60.00	\$480.00
▶ SE-8759	Hooked Mass Set	8 Remove ACTIONS	\$55.00	\$440.00
▶ ME-9472	Large Table Clamp	12 Remove ACTIONS	\$100.00	\$1,200.00

QUICKADD: Enter Part Number

1

ADD

* All displayed prices are for US Educational Institutions only.

Estimated Shipping Weight:

658.0 lb = 373.09 kg

Estimated Shipping Volume:

54.80 cu. ft.

UPDATE

SubTotal: \$22,520.00

CONTINUE SHOPPING

NEXT STEP

PASCO Terms and Conditions

Vernier Software & Technology

Your Cart

Quantity	Product	Order Code	Unit Price	Total
<input type="text" value="15"/>	Replacement Rod for the Dual-Range Force Sensor, Photogate, or the WDSS	ACC-ROD	\$4.00	\$60.00
<input type="text" value="15"/>	Ultra Pulley Attachment	SPA	\$24.00	\$360.00
<input type="text" value="15"/>	Photogate	VPG-BTD	\$45.00	\$675.00
<input type="text" value="4"/>	Motion Detector	MD-BTD	\$79.00	\$316.00
<input type="text" value="4"/>	Dual-Range Force Sensor	DFS-BTA	\$109.00	\$436.00
<input type="text" value="4"/>	LabQuest 2	LABQ2	\$329.00	\$1,316.00
Add a product by order code <input type="text"/>			Product Total	\$3,163.00
			Subtotal	\$3,163.00

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