PROGRAM REVIEW Fall 2017

Program: Geology
Division: MSEPS
Date: Aug 15, 2017
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Audience: *Deans, Vice Presidents of Student Services and Academic Services, All Planning and Allocation Committees. This document will be available to the public.*

Uses: *This Program Review will be used to inform the campus and community about your program. It will also be used in the processes of creating Division Summaries, determining College Planning Priorities and allocating resources. A final use is to document fulfillment of accreditation requirements.*

Time Frame: *This Program Review should reflect on program status during the 2016-17 academic year. It should describe plans starting now and continuing through 2017-18. This document also provides the opportunity to describe more long-term plans (optional).*

Sections: *The first section of this Program Review focuses on general program reflection and planning. The second section is a review of curriculum. Only programs with curriculum need to complete Section 2. The third section is a CTE update, to be completed by CTE programs only.*

Topics: *A list of topics of particular interest to Program Review readers can be found here:* https://goo.gl/23jrxt

Help: *Contact Karin Spirn: kspirn@laspositascollege.edu*

Instructions:

1) *Please respond to each question as completely as possible.*
2) *If the requested information does not apply to your program, write "Not Applicable."*
3) *Optional: Meet with your dean to review this document before October 13.*
4) *Send an electronic copy of this form to Karin Spirn and your Dean by October 16*

Links:

Program Review Home Page: https://goo.gl/XATgjJ

Fall 2016 Program Review Updates : https://goo.gl/YV8QOt

Frequently Asked Questions: https://goo.gl/iIhRtt

Section One: Program Snapshot

A. Data Review: Describe any significant changes to your program's data since last year's Program Review Update (Fall 2016).

Possible sources of relevant information might include, but are not limited to, the following:

- Data generated by your program
- Data from the OIR (Office of Institutional Research) (**https://goo.gl/b59nCy**)
- CEMC Data
- Labor Market Data
- SLO/SAO Data

	AY 2016-17		Data from Office of Institutional Research			
	Success	Enrollments	Program Status	Target Rate	Prev 5-years (AY11-12to15-16)	Range: [Min,Max]
College-Wide	71.8%	54,923	✓	67.7%	[70.6% , 71.7%]	[50665 , 53162]
GEOL	85%	1,057	✓	74%	[77% , 79%]	[915 , 1002]

The data above shows that both overall Geology enrollments and Geology success were both up. Consistent with last year, Geology SLO data indicated that students are successfully demonstrating their geologic learning.

From the Fall 12-Spring 17 OIR reports, the Geology headcounts and enrollments have remained fairly constant in range of 363-442 (headcount) and 437-513 (total course enrollments).

There is an even male/female split (right around 50% each), with most students 30 years old or younger.

Demographics continue to show a slow decrease in the percentage of students who declare themselves white, and an increase in those who declare themselves Asian.

Continuing students make up 60-90%, with 60% continuing students in the Fall terms and 90% continuing students in the Spring terms.

Roughly 60% of the Geology students are enrolled Full-time (12 units or more), and 30-35% of the students are enrolled Part-time (6-11.5 units)

Roughly 80% of the Geology students have Transfer as their Educational Goal, with students who declare Undecided at roughly 10%.

Roughly 60% of the Geology students are Freshmen, and roughly 25-35% are Sophomores.

Student success rates are high, and tend to average 70-80% for the Course Success Rate and 85-90% for Course Completion.

Geology Program Productivity numbers are very high for a college lab science program, with typical overall WSCH/FTEF between 560-650 (with the higher semester productivities when fewer lab sections are offered). For comparison, the campus as an overall had productivities between 490-554 and for other lab sciences, Biology and Chemistry productivities are generally in the 400s, and Physics productivities are generally in the 300-400s.

B. Changes to Program and Needs: Describe any significant changes to your program or your program's needs since the previous Program Review Update (Fall 2016).

The Geology course outlines were all updated Fall 2016, with the newly revised course outlines conforming as much as possible with the State C-ID course outlines where they are available. These newly revised course outlines become active Fall 2017.

Next, the Geology program is addressing 1) the constant pressure for more and more geology course offerings online, including laboratories, 2) the need to offer Historical Geology 3 & 3L to meet the Geology AS-T degree requirements, and 3) the potential/possibility for creating/offering a Geology certificate to allow formal recognition of students who complete many of the wonderful geology courses (without or before the completion of a traditional geology degree).

Financial/budgetary: the geology supply budget needs to support the yearly replacement/maintenance costs of the laboratory courses and materials. LPC has invested in a quality geology college science program with top notch materials and equipment. Student use of these materials and equipment, however, necessitates constant/continual upkeep, maintenance, repair and replacement of materials, supplies, specimens & equipment.

Converted Spring and Summer Geology 2017 courses to Canvas.

Adjusted the Geology program schedule to 'package' Geo 1 and Geo 12 (Oceanography) lectures and labs on the same days with contiguous time slots.

We developed a Safety Contract for the Lab students including the wearing of safety glasses when students are using HCl to test minerals/rocks. We also purchased student-use safety glasses and some lab sections created online for-credit quizzes that must be completed before students can access the other lab quizzes, to ensure student compliance.

Mark an X next to each area that is addressed in your response.

Definitions of terms: https://goo.gl/23jrxt

	Community Partnerships/Outreach
X	Curriculum*
X	Enrollment Management
	External Factors
X	Facilities,** Supplies and Equipment (Including Software)
X	Financial/Budgetary
	Human Resources
	Learning Support
	LPC Planning Priorities https://goo.gl/LU99m1
	Pedagogy
	Professional Development
	Services to Students
	SLO/SAO Process
	Technology Use

*Curriculum will also be addressed in Part 2 (Curriculum Review).

**Facilities will also be addressed in Question H.

C. Reflection: What plans from the 2016 Program Review Update or any previous Program Reviews/Updates have been achieved and how?

The Geology course outlines were all updated Fall 2016, with the newly revised course outlines conforming as much as possible with the State C-ID course outlines where they are available. These newly revised course outlines became active Fall 2017.

24 new Geology CSLOs were created with 3 new Geology CSLOs for each of the 8 Geology courses, and all 24 of those CSLOs went through the SLO committee approval process. A 3-year Geology SLO implementation & rotation-plan was created and posted in Canvas for all Geology faculty & staff to access & reference. All Geology courses offered Spring 2017 & Summer 2017 conducted the SLOs from this 3-year plan, with all instructors of the same course evaluating and entering data for the same SLO in the same semester.

Of note, the Geology program annual supply budget was severely reduced F6-S18. Continuation at that level will not maintain the quality Geology program that LPC has offered to-date. Grant funding has being requested when appropriate, but is not a substitute for an adequate annual supply budget.

An LPC Geology Dept Staff area in Canvas was established, and includes information on SLOs, Program Review, Course Outlines of Record, Lab Safety, Program Materials & Supplies, and Discussion forums on SLOs, Equipment, Materials & Supplies, Curriculum ideas, the Geology Program Catalog description, the investigation into the possible development of a Geology Certificate, the LPC Mammoth Bone, and other program topics and issues (e.g., using ConferZoom with Canvas for webconferencing with geology students or staff).

The LPC Geology Program participated in the LPC Spotlight Series event for Science & Technology in June 2017. Fluorescent samples were on display, along with hand-held ultraviolet lamps that users could handle and control. A floating egg demo was prepared and presented as an engaging puzzle that demonstrated that oceanic seawater is layered – and the layers do not mix easily. Additional samples and specimens were displayed and accessible for exploration. Geology Program handouts were available, along with a slideshow of geologic highlights which was playing continuously.

The LPC Geology Program contributed to the LPC Science & Technology flyer for the Silicon Valley Leadership Group. Of note, the 'concentrated Geology descriptions' are below:

Mark an X next to each area that is addressed in your response.

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X	Community Partnerships/Outreach
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• The LPC Geology program provides students hands-on Laboratory experiences with quality materials and equipment while also leveraging the advantages of interactive academic software. • LPC Geology offers an AS-T degree, and a Geology Certificate of Achievement is in development. • LPC offers Physical Geology, Historical Geology and Oceanography, as well as Environmental Geology courses in Resources, Pollution, Natural Disasters and Risk management. Additional descriptions of the LPC Geology Program included: Creativity in teaching Geology! Labs allowing mastery of the subject through persistence, using instructor-created materials in the academic software, coupled with hands-on exercises of all sorts. Creating informed citizens who can make better decisions regarding where to live, understand seismic and other geologic hazards, and encourage responsible resource and environmental management. Continuing to create both online and hands-on materials that foster meaningful learning, exploration, experimentation and feedback. Many students take only one lab course in their college career and we aim to make it the most valuable experience we can. Our students range from those taking Calculus to those uncomfortable with middle-school level math. We meet them where they are, and are able to illustrate the scientific concepts involved with simple arithmetic and graphs without sacrificing content. Incredible visuals are utilized constantly to SHOW the geology from site around the world. Our collection of images is huge, and constantly updated. Many students are fearful of being wrong, and we encourage their bravery in 'daring to be wrong'…a new concept for most. Large numbers of our students are international students, English as second language, EOPS, DSPS and returning Veterans. We offer support at office hours and encourage students to form study groups both in person and online.	

D. Impacts to Students (Optional): Discuss at least one example of how students have been impacted by the work of your program since the last Program Review Update (only if you did not already answer this in Questions A, B or C).

Updating & revising all of the Geology course outlines and completing and implementing the Geology 3-year SLO plan, adds to, and assists with, campus accreditation. An insufficient lab supply budget means that students have to work with samples and equipment that can be either damaged from previous students and/or have to work without samples or equipment that is missing (or damaged beyond use) and development of program materials had to cease. For F17-S18, with a supply budget to work with, we will now be working on obtaining the proper replacement/maintenance materials (including the supplies and materials to create additional 3D color block models, for example). Continuing to work on, explore, expand and develop experiential lab exercises and activities for what is predominantly a student population of non-science majors taking their one and only 1-unit Physical/Natural Science laboratory. Impact on students has included exploration-based learning in a lab setting, which is a new experience for most of our students. They try things, test samples, experiment, guess, get feedback, and try something else, until they are successful. This kind of iterative learning is beneficial as it rewards persistence, and attention to technique. It is also, the scientific method, in practice.	Mark an X next to each area that is addressed in your response. Definitions of terms: https://goo.gl/23jrxt	
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E. Obstacles: What obstacles has your program faced in achieving plans and goals?

A) Offering Historical Geology 3 & 3lab, a core geology course required for the Geology AS-T degree. However, community college geology courses rely on non-science majors fulfilling their Natural/Physical Science GE requirements, and Geo 1 is a prerequisite for Geo 3 – and Geo 1 fulfils the GE requirements, which means that, as interested as many students say that they are in Geo 3, because the prereq Geo 1 has already fulfilled their GE requirement, it is difficult for students to 'afford' the time of taking Geo 3 'just for fun'. In response, we moved the Geo 3 lecture to an online offering,	Mark an X next to each area that is addressed in your response. Definitions of terms: https://goo.gl/23jrxt	
		Community Partnerships/Outreach
	X	Curriculum*
		Enrollment Management
		External Factors

which successfully increased the Geo 3 enrollments above 20. The lab, we moved to a hybrid offering, however, the remaining (60%) on-campus time commitment prevented the Geo 3 lab enrollments from increasing the same way that the lecture enrollments did. As a result, and after discussing this with students over the years, we are now working towards combining the Geo 3 lecture and lab into one combined offering (following the State's GEOL 111 C-ID course descriptor). This process has been started in Curricunet this Fall 2017.

B) Pedagogy – continuing to work on, explore, expand and develop experiential lab exercises and activities for the challenge of what is predominantly a student population of non-science majors taking their one and only 1-unit Physical/Natural Science laboratory.

C) Budget: Challenge of having to use grants to fund almost all purchases…timing is limited and criteria and long time lines make this a helpful but an imperfect funding model. Need an adequate supply budget (of note, just recently, we were notified that the Geology department has some supply budget to work with for F17-S18). Grants are appropriate for only some of the things the program needs to purchase. Of note – when asking for supply money, the Geology program has been told to look to grants. However, when applying for grant money, the Geology program has been told that what we are asking for is supplies and should not be funded through a grant (this happened, for example, with the support funds that come with new buildings and happened repeatedly when asking for funds through previous incarnations or the current RAC committee).

E) Increasing student demand for online geology offerings. The LPC Geology program has worked extremely hard, with a tremendous time investment on a hybrid Historical Geology 3 laboratory offering, and Fall 2017 hybrid Geology 1 laboratory offerings. With that accomplished and/or being implemented, there is still pressure & demand for some sort of completely online geology lab offerings, especially since there are 4-year geology degrees, with online lab offerings now available. However, California state requirements for geology laboratories, makes this a much bigger challenge for us – and a lot more work for the Geology program and the geology instructor.

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**Facilities will also be addressed in Question H.

F. Short Term Planning: What are your most important plans (either new or continuing) for next year?

A) Working on Historical Geology 2, equivalent to the State's GEOL 111 Historical Geology with Lab. Working on the feasibility of creating this for offering through the OEI exchange when that becomes available.

B) Development and implementation of an LPC Geology Certificate of Achievement for students who love and enjoy and complete many geology courses, however, are not pursuing a formal Geology degree.

C) Continuing to pursue and support the construction and implementation of the Augmented Reality Sandbox for the Geology and Geography programs – with tremendous thanks and gratitude to Physics Instructor Travis White for coordinating this as a student maker-space project, and additional thanks to Nan Ho for finding some funds for Travis. W and his students to be able to start work on this project this summer 2017. We are currently awaiting word on an Innovation grant to continue funding this ongoing project.

D) Pedagogy – continuing to work on, explore, expand and develop experiential lab exercises and activities for what is predominantly a student population of non-science majors taking their one and only 1-unit Physical/Natural Science laboratory.

Continue to work towards lowering the cost-to-the-student for student lab materials. The excellent lab manual by the American Geological Institute and the National Association of Geoscience Teachers now costs more than $100. This is a workbook that students write in and tear pages out of, with the result that students can not purchase used ones nor can they sell their used ones to anyone else. As a result, we are currently working towards a) the purchase of a set of lab manuals to have on-site for student reference, and b) allowing student to purchase the much-cheaper electronic lab manuals to have as reference when they are not in the laboratory, and c) the development of lab exercises that do not require students to write in (or tear pages out of) the lab manuals. This is in line with the state initiative to move towards free student course resources and materials. Additionally, this follows the model where other LPC science programs have purchased sets of reference lab books/manuals for student lab access.

E) Investing in new LED lighting for the Geology indoor display cases, which have outdated inadequate tiny incandescent lights.

F) LPC has a 25+ year history of investing in quality lab materials & supplies in order to present high-quality student laboratory experiences and opportunities. In order to maintain and continue that tradition, supplies and materials are required on an annual basis.

Materials and Supplies:

item	est cost	description
Augmented Reality Sandbox	$ 2,000.00	topographic hands on learning tool

Mark an X next to each area that is addressed in your response.

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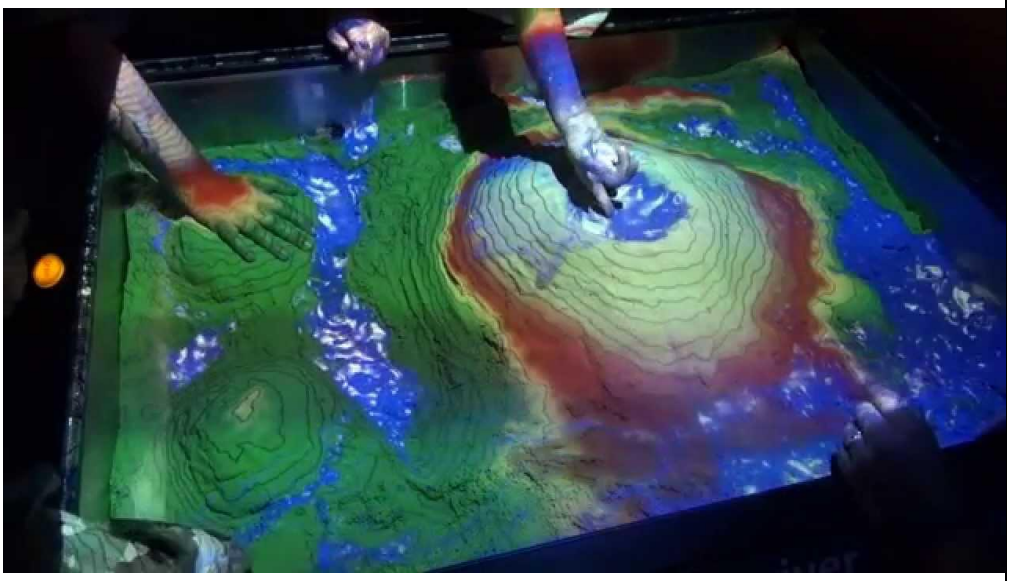
lab manuals	$ 3,000.00	set of 10th ed. AGI Phys. Geol. Manuals.
printer	$ 1,000.00	high quality color printer for L1824
rocks/min.	$ 1,000.00	hard to source samples
Student mineral testing supplies	$ 100.00	glass plates, white and black streak plates
containers	$ 250.00	plastic shoe boxes for storage
models	$ 750.00	Topographic models with low scale
electronic storage	$ 150.00	4 terabyte back up external drive
3D maps	$ 500.00	real maps in 3D- Yorkshire dales, etc.
paint	$ 50.00	create more 3D models for labs
clay	$ 20.00	clay for modeling landforms/layers
stands	$ 100.00	clear plastic stands for lab information
Maps	$250.00	(wear and tear plus new updated versions)
color printing + lamination	$500.00	(preservation technique)
computer supplies	$100.00	(back up hard drives for huge image collections, etc.)
depreciable office items	$50.00	
microscope care/supplies	$100.00	(bulbs etc, cleaning supplies)
color printer	$100.00	(in office printer is 10 years old and will need replacing soon)
printer toner	$100.00	
glue for labeling/repairs	$25.00	
demos-magnets etc	$50.00	
geology lab reference books	$50.00	
misc small stuff…(e.g., batteries, marking tape, etc)	$25.00	
lab station display sign holders	$50.00	
3-D printer material	$50.00	
geology student lab models	$250.00	
Safety glasses	$200.00	
7 Geoscience Lab latops	$2000.00	
Geology lab tech computer	$1500	

1) The Augmented Reality Sandbox is an ongoing student project to build an being coordinated by the Geology Lab Tech and Dr. Travis White. A group of seven students are learning engineering process by planning, testing, building a prototype, evaluating, and *modifying the plan* for a computer-generated light projection topographic mapping tool that utilizes sand. This will be a summer into fall and possibly even into spring 2018 project. Communication, documentation, error analysis and precision are all crucial parts of this process which will end with a working Augmented Reality Sandbox useable by the Geology and Geography

students.
http://content.newsinc.com/jpg/484/30909562/37992426.jpg?t=1464722340 This tool has been successfully used in many schools and museums since it was developed, and the plans released to public access by its creator, Dr. Kreylos, at UC Davis. Understanding 3D systems in Geology is complex and challenging. This tool transcends language issues, and allows the student to CREATE the map and see how elevations and topographic lines are related. Many of our students are learning in their second (or third…) language, and this kind of experience helps level the playing field. Many of our less advantaged students have had little experience in museums with hands on experiences. This is one more way to acquaint them with the power of making their own learning experience by experimentation. Flat maps representing lumpy ground are important but not intuitive. This amazing sandbox fosters successful understanding, fun while learning science, and the joy of figuring things out for yourself.



2) Following the state's initiative to lower student educational costs, we need to lower the student lab costs, particularly of the student lab manuals, which have recently exceeded 100 dollars per book for a single use workbook (some students are simply refusing to purchase them)s. By purchasing them and using them in the lab sections, students can have the full experiential lab experience with less cost out of pocket. Our materials in Canvas dovetail with the 10th edition, and we hope to be able to obtain them soon as the 11th is out and next term the 10th will not be available. The expense of textbooks is hard for students but if necessary they can sell them back. Workbooks such as lab manuals get taken apart and destroyed as they are used in normal circumstances. This will increase access, equity and diversity especially for lower income students.

3) A high quality color printer is vital to our creation of prototypes for things we will have Ricoh mass produce for use in labs. Many of these are then laminated and therefore costly. By testing each item we create first in color we verify that the printing is clear and clean and worth the expense of having Ricoh print it. The inefficiency of having to run back and forth across campus multiple times to vet sample prints has been a problem in the past. Color maps are especially tough to get right. By having the printer we can save on costs for the department and provide the students with reusable, sturdy materials for oceanography and Geology labs. This avoids asking the students to shoulder the cost of paying for their own maps, as we did in the past.

4) Hard to source samples are an ongoing challenge. Fairness and equity are served when students get the best lab experience with the purest samples. Upper division Geology students might love the difficulty of a complex sample with several minerals in it, but beginning students are confused, not amused! SO our mandate is that our samples in this first Geology lab course must be the best we can get, and must meet the description of the mineral's ID properties as precisely as possible. This requires sending back many unacceptable samples and continuing the search for great ones. Students, especially science-anxious ones, feel proud when their increasing skill with mineral identification comes from doing the tests correctly and getting the mineral name right. Bad samples are misleading, and cause students to feel frustrated that even correct technique might not yield the right answer. We owe it to them to have the best samples, so that the Geology and Oceanography lab experiences teach them *that scientific precision and care can be used to figure out what something is, beyond just looking at it*. For almost all our students this is their first ever experience with that. 5) Glass plates and ceramic streak plates are basic geology lab supplies for mineral testing. 6) Relatively low-cost 'shoe boxes' allow clear transparent storage of multiple geology lab materials including rocks, minerals, staplers, tape etc. By having everything visible, neat and stackable we promote a sense of order in the lab and encourage students to maintain it. They can see what they need and can return it to the right place. Some students have no past experience with this kind of environment and are used to treating things randomly. We are helping students build their organizational skills by modeling accessible, user friendly storage and reliable access - a good life skill. 7) Topographic models with low scale show a small piece of topography in detail. For our beginning lab students, again especially those with ESL , EOPS with little or no college experience, or international students, learning to use simple numerical models helps illustrate the concepts. These have far apart topo lines easing the reading of the elevations, and allowing the student early success. This then is the foundation for more complex activities like the AR sandbox and the typical 2D topographic map. 8) External backup hard drives have been a mainstay of our program's documentation and data back up. We continue to have our materials in multiple places, and the portable powerful hard drives allow moving huge volumes of large images easily. Geology is a very visual science and excellent quality images play a huge role in equalizing access for ESL, international and science anxious students. Beauty and drama in landscapes that illustrate geologic processes and events are hugely helpful, and also fun. 9) Real maps- of actual places- in 3D provide another way to create a low stress introduction to maps and topography. These are real places, unlike more generic simplified one. These show the Yorkshire dales for example, and allow students to see matching photos of the area, and correlate the relief map information with the actual area portrayed. This lowers anxiety among our nervous science students and promotes calm, which helps with effective learning. That is especially valuable for our ESL, DSPS, and other challenged students. 10) Paint supplies are needed to create additional variations of the very successful 3D 12x12x12 inch boxes that are used to help students visualize structural geology. Again we help all students with these but especially critical for students facing the challenge of first in their family to attend college, ESL, DSPS, international etc. This group of boxes will bepainted with two blank sides which will allow the boxes to serve as three dimensional questions for lab activities. Again- hands on, collegial	

activities in the lab promote experiential learning and success. Of note: these are in-house-created, successful 3-D models that are not available commercially. 11) The LPC Geology laptops are used extensively in the lab (and lecture) settings – this addresses equity of student access for course materials and assignments. The current LPC Geology laptops are in two sets of 7, with the older set being 8-years old and their operating system software can no longer be updated (they can not move beyond Windows 7 and need to be life-cycled-out). 12) The current Geology lab tech computer was not new when it was put into its current use. This current Geology lab tech computer is completely updated, however, can not function properly and crashes out programs (including Word) and constantly needs to be shut down and rebooted to make any slow progress. Please, please, please replace this computer.	

G. Long Term Planning (Optional): Please detail any long-term plans for the next 3-5 years. (Only if you have significant plans, such as implementation of a grant project, creation of long-term initiatives including those using restricted funds such as Equity or SSSP, construction and outfitting of a new building).

1) Offering one or more courses through the OEI – particularly Historical Geology 2 2) Exploration of a Geology Certificate of Achievement.	Mark an X next to each area that is addressed in your response.	
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H. Do you have any facilities needs that are currently unmet? If yes, please describe.

Increased storage needed for second floor science L1800 . Consider creation of access to 3rd floor M and O area in L1800. Would add hundreds of square feet of storage space to be shared with Physics and engineering. Need new elevator in L1800- in progress. As noted above, new lighting for L1824 Geology display cases to increase visibility and use.

I. Mission: Explain how your program's plans and accomplishments support the mission of Las Positas College:

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

The overall Geology program plan is to 1) provide lower division geology course college courses for both GE (non-science majors) and Geology majors, and 2) offer appropriate the appropriate Geology AS-T degree and a Geology Certificate of Achievement. The LPC Geology program curriculum currently offers Geology 1 & Geology 3, which are required for the Geology AS-T degree. The Geology program offers Geology 1, 3, 5, 7 & 12 for both GE (non-science majors) and Geology majors. A Geology Certificate of Achievement is currently in development (going through the Curriculum process). Fulfillment of SLOs, curriculum revisions/updates, program reviews, etc., add to the campus's eligibility for accreditation.

J. Program-Set Standard (Instructional Programs Only): Did your program meet its program-set standard for successful course completion? __x__yes _____no

(This data can be found here: https://goo.gl/b59nCy)

If your program did not meet your program-set standard, discuss possible reasons and how this may affect program planning or resource requests.

K. SLO/SAO Reflection: Describe an example of how your program used course SLO data (CSLOs), Student Service Area Outcome (SAO) data or Program SLO data (PSLOs) from last year (2016-17) to impact student learning or achievement. Focus on PSLOs or CSLOs where you have multiple semesters of data to analyze. (Copy the box below if you would like to discuss multiple examples.)

Course Name, Program Name or Student Service Area: Physical Geology 1 Lab
Text of the **CSLO**, SAO, or PSLO: Upon completion of Geology 1 laboratory, students will be able to evaluate and differentiate mineral samples
Describe the quantitative or qualitative results: Mastery 47.5%; Above Average 11.7%; Average 8.7%; Below Average 23.3%; No Demonstrated Achievement 8.7%. (consolidated data across lab sections by different/all instructors)

Discuss and reflect upon student achievement for this CSLO/PSLO/SAO. Discuss any actions taken so far (and results, if known) and your action plan for the future: The assessment successfully evaluated and assisted the students in their experiential laboratory learning process as they practiced mineral testing methods and techniques and then applied their learning to the evaluation of mineral samples. An additional quiz was just added to this first one, and the students scored an average of 93.4% on the subsequent quiz. We have been (and still are) spending a considerable amount of time and effort by all of the geology lab instructors and the geology lab tech, creating new and improved experiential lab experiences, activities and exercises. A tremendous amount of time and effort has been applied towards the students' pedagogical experiences and achievements.
What changes in student achievement are evident across the semesters you analyzed? What are some possible explanations for these changes in student achievement? New Geology SLOs were implemented Spring 2017, so we have the Spring 2017 data (above) with the instructor's qualitative assessment (above) Comparing with the similar F14-S15 Geology 1 Lab PSLO: Upon completion of this degree, students should be able to demonstrate proficiency in the evaluation and identification of basic earth materials (e.g., rocks and minerals). Mastery 30%; Above Average 27%; Average 13%; Below Average 11%; No Demonstrated Achievement 19%. Comparison shows an increase of mastery of 17.5% and a decrease of 10% in 'No Demonstrated Achievement' – this can be attributed to the tremendous amount of instructor and technician time (still ongoing) applied towards creating and developing new experiential laboratory exercises.

L. Plans for Analysis of SLO/SAO Data: Identify the PSLOs, CSLOs, or SAOs that your program plans on focusing on the upcoming year with subsequent analysis. (Copy the box below as needed.)

Circle One: (CSLO) PSLO SAO
Course, Program Name, or Student Service Area: Geology
Text of CSLO/PSLO/SAO: The CSLOs in red (below) were assessed Spring and/or Summer 2017 and data was entered into elumen. All sections of the courses conducted and entered data for the same CSLOs. These CSLOs will be repeated Fall 2017. New SLOs (from the approved list below) will then be assessed Spring, Summer and Fall 2018. **GEOL1 - Physical Geology** • **Upon completion of Geology 1, students will be able to define and identify the geology of divergent, convergent and transform plate tectonic environments.** • Upon completion of Geology 1, students will be able to identify and define the basic properties of minerals. • Upon completion of Geology 1, students will be able to identify and differentiate the basic ages of the Geologic Time Scale. **GEOL1L - Physical Geology Laboratory** • **Upon completion of Geology 1 laboratory, students will be able to evaluate and differentiate mineral samples** • Upon completion of Geology 1 laboratory, students will be able to evaluate and differentiate rock samples • Upon completion of Geology 1 laboratory, students will be able to evaluate and interpret geologic diagrams encapsulating geologic histories. **GEOL3 - Historical Geology** – *this course is only offered once every 2-3 years. The course was offered Fall 2015 and is slated to be offered again Spring 2018, when data for all 3 SLOs will be entered into elumen.* • Upon completion of Geology 3, students will be able to define and identify the geology of divergent, convergent and transform plate tectonic environments. • Upon completion of Geology 3, students will be able to evaluate and interpret geologic diagrams encapsulating geologic histories (sequences of events). • Upon completion of Geology 3, students will be able to identify and differentiate the types and methods of fossilization. **GEOL3L - Historical Geology Laboratory -** *this course is only offered once every 2-3 years. The course was offered Fall 2015 and is slated to be offered again Spring 2018, when data for all 3 SLOs will be entered into elumen.* • Upon completion of Geology 3 laboratory, students will be able to evaluate and/or interpret geologic diagrams encapsulating geologic histories

(sequences of events).
• Upon completion of Geology 3 laboratory, students will be able to identify and differentiate fossil samples.
• Upon completion of Geology 3 laboratory, students will be able to interpret, analyze and/or explain complex geologic concepts and principles through
geologic cross-sections.

GEOL5 - ENVIRON.GEOL:HAZARDS/DISASTERS – *this course is only offered once every other year; the course was offered Summer 2017 and data for all 3 SLOs were entered into elumen*

• **Upon completion of Geology 5, students will be able to define and identify the geology of divergent, convergent and transform plate tectonic environments.**
• **Upon completion of Geology 5, students will be able to identify and/or explain the fundamentals of stream systems, including flooding.**
• **Upon completion of Geology 5, students will be able to identify and/or explain volcanic geohazards.**

GEOL7 - ENVI GEOL:RESC/USE IMPACT/POLL - *this course is only offered once every other year; the course is slated to be offered either Spring 2017 or Summer 2017, at which time data for all 3 SLOs will be entered*

• Upon completion of Geology 7, students will be able to define and identify the geology of divergent, convergent and transform plate tectonic environments.
• Upon completion of Geology 7, students will be able to identify and differentiate the various types of fossil fuels.
• Upon completion of Geology 7, students will be able to identify and/or evaluate the various methods of groundwater pollution.

GEOL12 - Introduction to Oceanography

• Upon completion of Geology 12, students will be able to analyze, differentiate and/or identify the basic marine life habitats.
• **Upon completion of Geology 12, students will be able to define and identify the geology of divergent, convergent and transform plate tectonic environments.**
• Upon completion of Geology 12, students will be able to identify and differentiate basic marine geomorphologies (e.g., seamounts, guyots, continental
shelf, submarine canyons, etc.)

GEOL12L - Intro to Oceanography
Lab

• Upon completion of Geology 12 laboratory, students will be able to construct bathymetric contours
• Upon completion of Geology 12 laboratory, students will be able to evaluate (test and identify) sea floor samples
• **Upon completion of Geology 12 laboratory, students will be able to interpret bathymetric maps**

If you plan on analyzing a PSLO, identify the CSLOs that feed into the PSLO that will need to be assessed.

Section Two: Curriculum Review
(Programs with Courses Only)

The following questions ask you to review your program's curriculum. To see the last outline revision date and revision due date:

1. Log in to CurricUNET
2. Select "Course Outline Report" under "Reports/Interfaces"
3. Select the report as an Excel file or as HTML

Curriculum Updates

A. Title V Updates: Are any of your courses requiring an update to stay within the 5 year cycle? List courses needing updates below.

All Geology courses: 1, 1L, 3, 3L, 5, 7, 12, 12L, were updated and passed through Curriculum (and Curricunet) in Fall 2016, with the revised/updated outlines slated to become active Aug 15, Fall 2017.

B. Degree/Certificate Updates: Are any degrees/certificates requiring an update to do changes to courses (title, units) or addition/deactivation of courses? List needed changes below.

The Geology AS-T degree does not need changes at this time.
The Geology Program is currently developing a Geology Certificate of Achievement. Currently in the Fall 2017 Curriculum process. Modeled after a Geology Certificate of Achievement currently offered at Ohlone College.

C. DE Courses/Degrees/Certificates: Detail your department's plans, if any, for adding DE courses, degrees, and/or certificates. For new DE degrees and/or certificates (those offered completely online), please include a brief rationale as to why the degree/certificate will be offered online.

Geology 2 (Historical Geology with Lab) is currently going through the Fall 2017 Curriculum process. This Historical Geology 2 course is the State's C-ID GEOL 111 Historical Geology with Laboratory course. GEOL 111 is currently offered at several other California community colleges (e.g., Modesto College, College of Marin, Merced College, Hartnell College, etc), and satisfies the Natural/Physical Science GE requirement. Historical Geology is a required lower division course for Geology majors and is required for the Geology AS-T degree. LPC currently offers Historical Geology 3 and 3Lab as separate courses; however, with them as separate courses, the Historical Geo lab course struggles for enrollments. Combining the lecture and lab into one combo course (as with many Biology, Chemistry and Physics courses), will hopefully increase student enrollments and facilitate student comprehension of the course content by integrating the laboratory content into and with the lecture content.

Section Three: CTE Updates
(CTE Programs Only)

A. Labor Market Conditions: Examine your most recent labor market data. Does your program continue to meet a documented labor market demand? Does this program not represent unnecessary duplication of other training programs in the college's service area? (Please note: your labor market data should be current within two years. Contact Vicki Shipman or the current CTE Project Manager for access to data).

B. Advisory Boards: Has your program complied with advisory board recommendations? If not, please explain.

C. Strong Workforce Program Metrics: Utilizing LaunchBoard, review the Strong Workforce Program Metrics. Review the data and then answer the following questions.

(Contact Vicki Shipman or the current CTE Project Manager for help accessing the data).

C1. Does your program meet or exceed the regional and state medians **for increased enrollments, completions, and/or transfer since your last program review**? If not, what program improvements may be made to increase this metric?

C2. Does your program meet or exceed the regional and state medians **for students gaining employment in their field of study**? If not, what program improvements may be made to increase this metric?

C3. Does your program meet or exceed the regional and state medians **for student employment rates after leaving the college**? If not, what program improvements may be made to increase this metric?

C4. Does your program meet or exceed the regional and state medians **for increased student earnings and median change in earnings?** If not, what program improvements may be made to increase this metric?