

Program Review Update Division Summary 2019

Division/Area: **STEM (Science, Technology, Engineering, and Mathematics)**

Dean/Administrator: **Nan Ho, Dean**

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Programs Included:

- Astronomy**
- Biology**
- Chemistry**
- Computer Information Systems**
- Computer Networking Technology**
- Computer Science**
- Engineering/Engineering Technology**
- Environmental Science**
- Environmental Studies**
- Geography**
- Geology**
- Horticulture**
- Occupational Safety and Health**
- Physics**
- Radiation Safety**
- Viticulture/Winery Technology**

**I. Executive Summary (Optional): Please describe the most important themes, trends, and developments in your division or area. Your summary should identify accomplishments, plans and obstacles to success. Your summary should be no longer than 500 words in length.**

The STEM Division offers high-quality programs, many of which are growing, and some that are limited in their growth due to resource limitations, especially in relation to facilities. Faculty and classified professionals create and deliver exemplary learning opportunities for students in classrooms, labs, clubs, honor societies, and through projects and events. Many members of the Division are involved in shared governance on campus and at the district, with several serving in leadership roles for different initiatives (Guided Pathways, Equity, AB 705) and in senates and collective bargaining units. Departments are highly collaborative in their work on enrollment management, hiring, scheduling, and evaluating. The STEM Division partners with colleagues, Divisions, and services throughout campus to support students in their paths towards educational or career goals. Three separate facilities projects involving STEM are underway (Building 2100, Horticulture, Viticulture), requiring the input and expertise of our faculty and classified professionals.

Major accomplishments related to curriculum and course offerings include implementation of AB705 in math, noncredit curriculum (NCIS, NHRT, NMAT), revision of curriculum, and writing of new curriculum (especially in Engineering) for adoption next Fall 2020. STEM faculty and staff contributed their energies to serving on more than a dozen hiring committees that successfully selected dynamic new colleagues. Two new positions were added to STEM: a much-needed Chemistry FT faculty member and a STEM Program Coordinator. The STEM Coordinator has already positively influenced the Division through stewardship of existing programs and the exploration and implementation of new ideas and partnerships that serve students and the community. The Division celebrated the contributions of college personnel and community partners for both the 10-year anniversary of the LLNL/LPC

Science and Engineering Seminar Series, which has served thousands, and the 5-year anniversary of the Engineering Technology Learning Community, which has more than 40 graduates in its short tenure.

Major challenges remain from prior years, and new ones have developed. The pace of change and the urgency of responding to state and funding initiatives must be managed carefully to ensure that our most valuable assets, our people, can thrive and sustain our levels of excellence and creativity. Rapid growth brings many challenges—lack of facilities, funding, and time, and the need for more full-time and part-time faculty and classified professionals. A shortage of computer labs (to serve Math, CS, and Engineering students) and science laboratories has resulted in several missed opportunities to add or offer classes to meet demand for STEM courses. Many programs are at or above capacity for existing facilities. Scheduling classes across interlinked STEM departments to facilitate students' timely completion of degree or transfer requirements is increasingly complex due to multiple constraints (space, staff, conflicting classes, block schedules, prerequisites, load, AB 705, enrollment patterns, etc.); the faculty and staff work together given these constraints to optimize schedules for students. The lack of full-time faculty has made it increasingly challenging to staff classes with part-time faculty, even when there is demand for additional sections, especially in biology and chemistry. Some of our excellent part-time faculty have been hired into full-time positions at other colleges, creating a loss of talent if we are unable to offer FT positions. New FT requests submitted this year, but not ultimately funded, to the Faculty Hiring Prioritization Committee include Chemistry, Computer Science, Biology, and Math. One existing Math FT faculty position remains vacant and needs to be filled as soon as possible to help the math program meet the significant responsibilities placed on the College in response to AB705 and the Student Centered Funding Formula. Likely FT faculty retirements in the near to mid-term future will require a responsive hiring process to replace vital leaders. Reassigned time allocations do not sufficiently reflect the contributions of program coordinators. The high turnover rate among lab technicians has been challenging and is unsustainable. Career trajectories of our classified professionals should be addressed. With increasing size and growth of STEM programs, the Division Office has reached its capacity to provide the best services to all programs, personnel, and students.

STEM has the opportunity, given more resources (faculty, staff, budget, and professional learning), to innovate, create, and expand existing programs to meet changing needs of our community and workforce. Sample areas include environmental chemistry, brewing science, environmental technician, bioinformatics, data science, occupational safety and health, electrical engineering technology, and drone technology and application to agriculture.

The STEM Division exemplifies the best of Las Positas' commitment to student learning, collaboration, leadership, and innovation.

**II. Recommendations: Please list your most important recommendations for planning in your division or area. Note any recommendations that are connected to our College's Planning Priorities or Educational Master Plan.**

- **Support departments in identifying and requesting sufficient resources for staffing, equipment, supplies, and technology.** (Educational Master Plan-Educational Excellence, Supportive Organizational Resources, Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support increased FTEF allocation through enrollment management to address continued growth in STEM programs.** (Educational Master Plan-Educational Excellence, Supportive Organizational Resources, and Organizational Effectiveness, Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support streamlining and standardizing of institutional processes to alleviate time demands on faculty and staff.** (Educational Master Plan-Supportive Organizational Resources, Organizational Effectiveness; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support institutionalization and funding of various specialized student learning spaces and programs.** (Math Learning Center, Computer Center, Biology Learning Center, Math Jam, Maker Space, and

Engineering Technology Learning Community). (Planning Priorities- Planning Priorities-ACCJC, Equity, Student Success and Completion; Educational Master Plan-Educational Excellence)

- **Support increased staffing to support instructional programs.** (Planning Priorities- Planning Priorities-ACCJC, Equity, Student Success and Completion; Educational Master Plan-Educational Excellence, Supportive Organizational Resources)
  - **Hire replacement and new full-time faculty.**
  - **Increase lab technician coverage in science and horticulture/viticulture.**
  - **Increase math instructional assistant hours.**
  - **Increase student assistant support across departments.**
- **Support increase reassigned time to more accurately reflect responsibilities.** (Educational Master Plan-Educational Excellence, Supportive Organizational Resources; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support stabilization of supply and equipment maintenance budgets.** (Educational Master Plan-Educational Excellence, Supportive Organizational Resources, Organizational Effectiveness; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support curriculum processes (departmental review, curriculum committee) to encourage regular review of curricular needs in course outlines, certificates, and degrees.** (Planning Priority-Curriculum; Educational Master Plan-Educational Excellence; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support faculty and staff in addressing how to sustain rapid growth in STEM over the next 5-7 years using existing facilities which are at or above capacity.** (Planning Priorities- Planning Priorities-ACCJC, Equity, Student Success and Completion; Educational Master Plan-Educational Excellence, Supportive Organizational Resources; Organizational Effectiveness)
- **Support work on Measure A/Facilities Master Plan and construction projects for 2100, Horticulture, and Viticulture buildings to reflect the specific needs of programs; encourage user groups to form and begin more detailed analysis of needs for next major projects including STEM expansion and renovation.** (Planning Priorities- Planning Priorities-ACCJC, Equity, Student Success and Completion; Educational Master Plan-Educational Excellence, Supportive Organizational Resources)
- **Support increased engagement of part-time faculty in program responsibilities.** (curriculum, outreach, etc.), ( Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support cross-disciplinary work on optimizing scheduling, given Guided Pathways, AB705, and limited facilities.** (Educational Master Plan-Educational Excellence; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support program outreach to and partnerships with community, educational institutions, and industry.** (Educational Master Plan-Community Collaboration; Educational Master Plan-Supportive Organizational Resources, Organizational Effectiveness; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support professional development of faculty and staff.** (Educational Master Plan-Educational Excellence; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Support development of part-time faculty pools.** (Educational Master Plan-Supportive Organizational Resources, Organizational Effectiveness; Planning Priorities-ACCJC, Equity, Student Success and Completion)
- **Stabilize ongoing funding for vineyard care.** (Educational Master Plan-Educational Excellence, Supportive Organizational Resources; Educational Master Plan-Community Collaboration; Planning Priorities-ACCJC, Student Success and Completion)

### III. Program Review Themes by Category

Please describe the most important themes, accomplishments and challenges for your division/area in each of the following categories. If a category does not apply to your division/area, or if that category was not discussed in your division/area's Program Review Updates, please write "Not Applicable."

**a. Community Relationships and Partnerships**

Such as outreach, recruitment, internships, industry collaborations.

Programs have differing degrees of outreach. Outreach would help increase enrollment and highlight the great work being done at LPC. The STEM Program Coordinator will strengthen this area in the coming year.

BIO offered its third year of the Biotech Bootcamp in Summer 2019, attracting students from local high schools.

CHEM reports continued success in placing STEM students in internships at Sandia, LLNL, LBL, and local companies.

COMPUTING STUDIES: CNT is in continuous development of their relationships with Google and JFF regarding the Google IT Support certificate. The Google curriculum has increased enrollments of associated courses.

ENGR have had preliminary discussions with local high-tech employers, including Gillig (Livermore), HNTB (Oakland), and others regarding possible collaborations. Enhancing Career Readiness: The Engineering Technology program has graduated 37 students with an AS degree since its inception in 2014; 18 of those students have earned full-time employment at Lawrence Livermore National Laboratories as technicians or technologists. Both Engineering Transfer and Engineering Technology students would benefit from more internship opportunities. Some of this is starting to happen; making this a higher priority would likely lead to more opportunities.

GEOG: The GIS offering in the program has potential to partner with local industry.

HORT offered its first noncredit class, in partnership with Pleasanton Unified School District and Sunflower Hill, a foundation that works with developmentally disabled adults. A second noncredit class will run in Spring 2020. The faculty and Horticulture/Viticulture lab technician coordinate with instructional aides assigned to the noncredit class by the Pleasanton Unified School District. Horticulture also wants to reach out to students with developmental disabilities and increase enrollment through outreach with employers and local school districts.

MATH partners offers free one-on-one math tutoring on campus for local high school students on our campus. This program arose from a pilot program with LVJUSD and has expanded to include all local high schools. As enrolled LPC students, the high school students have access to our library and the Wheels Free Ride program. The department meets regularly with Tri-Valley high school math teachers and coaches to discuss alignment of curriculum, pathways, placement, and success and retention. Math offers a section of year-long Calculus III at Amador Valley High School, with consistently high enrollment and success rates. This class is open to any student, but marketed to our local high school students as concurrent enrollment.

OSH-RADS identified new Advisory Board members to improve communication on employer needs.

VITICULTURE: The Campus Hill Winery may sell the wine it makes starting Fall 2019 harvest. Regular communication with neighboring Shea Homes revolve around vineyard maintenance, and requires support from District M&O and LPC Academic and Administrative Services.

**b. Curriculum Committee Items**

Changes made through the curriculum committee, such as changes to course outlines, degrees and DE status.

## Program Review Update Division Summary 2019

The Division maintains currency of course outlines, and is actively engaged in considering new courses, certificates, and degrees. Several programs are developing certificates in response to needs; UC transfer pathways have been approved locally. New courses/programs in Engineering have been a major achievement as these ensure engineering students are aligned to an academic program and able to access financial aid.

BIO reports significant updates and plans for a new intro lab course. The faculty have developed a UC Pathway Certificate of Achievement that includes relevant UC BIO coursework and supports the SCFF and Guided Pathways initiatives. The program needs to update BIO 1B and 7B, and general education classes BIO 20, 30, 40, 50 and 60. The program offered BIO 55 - Orientation to Healthcare for the first time last year. Plans are underway to update Bio 50 with an online option. The program is considering an Environmental Science class, Biotech program, and more certificates in areas of wildlife technician, phlebotomy, and clinical lab science. These initiatives would require additional faculty expertise.

CHEM plans to update all seven Course Outlines (1A, 1B, 12A, 12B, 31, 30A, 30B) and update laboratory curriculum.

COMPUTING STUDIES is currently reviewing but has not yet submitted courses, certificates and degrees for updates. Approximately 12 courses need 5-year cycle update.

ENGR has submitted updates to the current AS requirements for the AS degree in Engineering Technology, and created AS degrees and certificates for Engineering majors, including UC Pathways. The program is reviewing the ramifications of making some ENGR courses C-ID compliant. ENGR 44 (Intro to Circuit Analysis) would likely experience a decrease in enrollments if prerequisites/corequisites match C-ID descriptors.

GEOG updated its degree to include statistics. The program added 2 new certificates. Two courses were previously certified by OEI (Geography 1 and 12), with two in progress (Geography 5 and 7). GEOG has not been successful in adopting a format to provide online GEOL labs.

OSH-RAD is considering implementing a lab component into program, but is running into challenges.

VIT: The Wine Hospitality Career Certificate was successfully converted to a Certificate of Achievement.

### **c. Enrollment Management**

Changes to section offerings, such as adding/removing sections or increasing/lowering class size.

There is significant growth (and waitlists) in BIO, CHEM, CS, and PHYS, and shifting patterns in geology and geography enrollment. CEMC has been supportive of adds on a per-term basis, and has approved FTEF increases to annual allocations to reflect that these courses have a strong history of being successfully requested and filled. CTE programs HORT, OSH, and VIT show stable enrollments. Some new programs are being developed which will help enrollment. Late start concerns are part of a larger discussion about enrollment patterns. DE late start has been viable in some cases. Attempts to add high-demand classes have been constrained by lack of labs (computer, math, and science), difficulty hiring faculty, and unpredictable factors such as post-AB 705 demand for classes.

BIO continues to add classes to the schedule to meet students' needs, which results in back-to-back labs and lectures. Particularly impacted are all the core classes in the Allied Health and Biology Majors programs. More night sessions have been added to meet the needs of working students, and an all-day Friday session was added for Anatomy. The program projects the need to hire full-time faculty in Biotechnology to develop a Biotechnology program and a new full-time faculty in the Biology majors area.

CHEM has a fill rate of almost 100%, continues to grow, added a 6th section of CHEM 1A in the fall and additional CHEM 31 sections in the spring. The program desires to create non-major's course to support

## Program Review Update Division Summary 2019

science GE requirements for Environmental Chemistry, Chemistry and Society, or Brewing Science. Concerns with CEMC allocation and avoiding competing with other GE science classes has made this a lower priority.

ENGR has developed a new course, ENGR 50 (Intro to Electronics Systems) designed as an electronic option for students in the Engineering Technology AS program and with the recommendation of the Engineering/Engineering Technology Advisory board. Scheduling is a particular challenge due to room availability and the inability of FT faculty to teach Wed afternoons. Scheduling issues for students to complete their engineering requirement before transfer are addressed as quickly as possible, with recent additions of Math and CS course to offer options to those students. Engineering course enrollments, since 2015 saw a slight increase and over the past year a slight decrease. Spring numbers have been higher in recent years. Female enrollments have increased by 5% in fall and 8% in the spring. Latinx enrollments have increased by 9%; there is a 13% decrease in White students.

GEOG noted percentage increase in DE students, especially in fall, and a consistent decrease in fill rate over the past several years and course cancellations due to low enrollment. Geography had historically not cancelled classes due to low enrollment, but has happened three times in the past two years. Given the very recent enrollment decline for the college as a whole, geography may decide to offer fewer sections in the near future to offset lower fill rate decrease. GEOG 5 needs to be made available as a DE class.

GEOL is a leader in the OEI process, with 4 course approved or in-progress; the program reports OEI search site issues and errors. The programs offers Fast Track 2 courses targeting students wanting GE but not able to start at the beginning of the regular term. Scheduling class meeting times increased enrollments. The program is exploring DE lab-based course to address a perceived student demand.

HORT offers four progressive Certificates of Achievement and an A.S. degree. The program is offering noncredit classes and certificate in partnership with the Pleasanton Unified School District as discussed in Community Relationships and Partnerships. The program has strived to offer 3 classes each term to allow students the best opportunity to complete in a timely fashion; one class was canceled in Spring 2019, due to low enrollment.

MATH offered noncredit NMAT courses for the first time. In basic skills classes, students can choose either to earn credit (MATH 107, MATH 110, MATH 50, MATH 55), or take the noncredit mirrored course tuition-free (NMAT 207, NMAT 210, NMAT 50, NMAT 55). Concurrent support classes offer the same options at the basic skills levels (MATH 100C, MATH 101C, MATH110C, MATH 55C, NMAT 200C, NMAT 201C, NMAT 202C, NMAT 210C, NMAT 255C). Math Jam has been converted to noncredit (NMAT 260A & B, NMAT 261, 262, 263, 264, 265) with noncredit certificates, and MATH 66, 67, and 68 (0.5 unit each) as Math Jam credit course to prepare for Calculus levels. The department experienced significant changes in enrollment with more students taking the STEM Pathway and transfer classes and fewer students choosing basic skills. More sections of statistics (MATH 40) and Calculus 1 (MATH 1) were added accommodate the increase, and while sections of Intermediate Algebra (MATH 55) and Core Intermediate Algebra (MATH 50) were canceled. Much of this shift can be attributed to more use of High School Data to place students into their classes. MATH 55 and MATH 110 co-requisite pilots (MATH 55C and MATH 110C) served as models for the concurrent support classes offered at all levels through Calculus. In spring 2019, the program piloted one Fast-Track path of a STEM cohort of Math 30 followed by Math 39 in two 8-week sessions. This was highly successful and we are continuing to offer fast track courses this fall. Some progress has been made in moving first-level transfer courses into the OEI. MATH 40 was successfully submitted for OEI review. MATH 34 is tentatively being considered form OEI. Success rates for DE, Hybrid (HD or HY) are being reviewed by the department. The program needs suitable proctoring methods before full OEI implementation.

## Program Review Update Division Summary 2019

VITICULTURE enrollment is stable from fall to fall, with increases from spring to spring attributed to new courses. The program would like to increase course offerings, especially for the wine hospitality certificate so that students can complete in one year.

### **d. External Factors**

Such as state/accreditation mandates or advisory board directives.

Advisory boards are active and have provided directions to programs on academic programs. The LPC Viticulture and Enology Wine Foundation has been approved, which will necessitate the responsibilities of a public entity including tax filing and other accounting responsibilities. The new Faculty Association has contractual language to provide coordinator time for these tasks, which are an addition to program coordinator duties.

ENGR 50 and the Engineering Technology AS degree, plus multiple new certificates and degrees in Engineering were developed upon recommendation by the Engineering Advisory Board, which currently meets twice a year. The creation of a Machining Course at LPC, Welding 10, led by Welding instructor Scott Miner, resulted from recommendations from the Advisory Board, and was offered at LPC for the first time during Spring 2019.

GEOL faculty has seen a growing trend of late start GEOL classes at other colleges, which may negatively impact enrollments. The faculty requests to offer late start GE which are favored by students.

VIT was recently approved for a wine bond, allowing the making and selling of wine, and presenting the challenge running a Foundation in addition to the academic program. The program created the wine hospitality certificate in response to the industry Advisory Board, and seeks to increase course offerings so students can complete in one year.

### **e. Facilities, Supplies, and Equipment**

Purchasing or upgrading

The ability to respond to student demand for additional sections is impaired by lack of lab space. Lab facilities are crowded and many are beyond capacity, interfering with sage operations. There is an acute need in BIO, CHEM, ENGR, and PHYS. GEOG and GEOL share crowded common spaces and have significant storage needs. HORT and VIT facilities are outdated and crowded for students to safely operate (especially in the winery). New facilities are in the planning process which will eventually address HORT and VIT facility needs; the opening of these buildings is not scheduled until at least 2022. A much-needed STEM expansion is urgent, but even more distant.

The STEM Division has extensive and continuous needs for supply budget that keep pace with course offerings. Equipment needs are ongoing to stay current with industry standards. The IER process, augmented with additional CTE funding and general funds, has been used effectively to maintain quality teaching and learning experiences for students.

BIO notes that its largest obstacle is the urgent need for more facilities due to the growth of the program. There is need for new Science facilities. Due to an increase in sections, Honors and Independent Study Projects have increased student use of the Microbiology workroom, impairing effective use of the space by microbiology students for meeting their course objectives. Construction on a pond outside of the 1850 building began, supported by a grant from the LPC Foundation. The pond will become an outdoor laboratory. There is still no permanent location to store food used in BIO labs (1A, 7B, 1B, 30, 50) that serve hundreds of students. Additional storage and bench space is needed for Anatomy models due to increased section offerings.

## Program Review Update Division Summary 2019

CHEM acquired new glassware, pH probes, Updated Periodic Tables, Lab Jacks, distillation columns, and other equipment through the IER process. Budgets for lab supplies and equipment maintenance have been cut dramatically. The NMR upgrade supported by an IER has meant a modern computer, upgraded electronics, and new software, providing a decade of anticipated use. The number of sections has increased by about 10%; all classes have critical laboratory component. Glassware and equipment break and/or wear out, but supplies budget was cut this year by 15%. The program has cut as much as possible but lowered budget with increased offerings is not sustainable. The supply budget needs to be increased with increasing enrollment. Both the GCMS and AA instruments have had significant repair issues that must be addressed. Lab classrooms are at or near capacity. More than half of CHEM 1A and IB students have to share lockers for glassware.

The program suggests renting portable laboratory facilities.

ENGR needs more or expanded laboratory space. This would most likely occur from other disciplines vacating space to move into new construction, but that may not happen for several years.

GEOG reports the amount of geography space is inadequate, so should be increased so new equipment and lab materials can be purchased.

HORT has a new facility underway, with a proposed occupation in Spring 2022. In the meantime, the program still faces the lack of classroom, lab, and office space. This is not likely to improve until a new Horticulture facility is built.

MATH has experienced greatly increased demand for MATH 40 (Statistics) with the implementation of AB 705. Many new sections were added but there are not enough computer lab classrooms. The department needs more facilities with enough computers to meet the state-mandated technology learning outcomes for our statistics courses. Facility development is underway with the new Building 2100, which will house the Math Emporium, the Math Learning Center, and a proctoring center. In the meantime, demand for computer labs needs to be addressed to allow program to offer high-demand classes.

OSH-RADS purchased new equipment (personal protective equipment, electrical circuit testers, 4-gas meter) for teaching needs. These are currently stored in Building 2100. The program requests a more accessible storage location for OSH equipment and supplies.

VITICULTURE facility needs are detailed elsewhere. The new Viticulture teaching winery will address these needs when the building is completed. In the meantime, the winery has space limitations for the number of students.

### **f. Financial/Budgetary**

Program budgets or special funding.

Division-wide budget cuts (based on College-wide cuts) in 2019 have had negative effect. Supply, maintenance, and equipment repair budgets are inadequate. Many STEM programs have added sections in response to high demands from students and to college enrollment management, but budgets to support these additional sections has not increased proportionately or adequately.

BIO plans to work with the lead lab technician and Dean to assess that our supply budget is able to fund the expenses of adding sections each semester. The general budget for supplies and equipment maintenance and repair is not adequate and was cut for the current year, which is not sustainable to support the growth of course offerings or the industry-level technology required for curriculum. The past two years have required augmentation from CTE funds, so there is a need for institutionalized, reliable funding to accomplish goals each semester, instead of having to constantly pursue stop-gap measures. The program has pursued funding from SCFF, LPC Foundation (Biotech Entrepreneurship Program), and NSF to increase



## Program Review Update Division Summary 2019

opportunities for students. Labor market data shows an increased need for biological science technicians, and jobs at this level remain unfilled in our area. To support training of biological science technicians in our area, the program submitted a grant to the National Science Foundation this year to increase training opportunities in our biology courses. There is no reliable source to run the Biotech Bootcamp, and there is no budget for Honors and Independent Study Projects.

CHEM (as discussed elsewhere) class offerings have increased by about 10% with each class having a critical laboratory component. The supply budget is insufficient to support current and increased course enrollments. Glassware and equipment break and/or wear out, but our supplies budget was cut this year by 15%.

COMPUTING STUDIES successfully participated in a grant to offer Code Jam to increase underrepresented populations in CS. There are challenges to recruitment to program and plans to develop non-credit courses by 2021.

ENGR, as measured by SCFF metrics, does not appear to be strong in terms of enrollment, or in maintaining other aspects of its program. The program transfers 25- 30 students every year. The faculty are concerned that Engineering is vulnerable to cuts and reduction of courses. Students may take Engineering courses at nearby community colleges, which impact ENGR, higher-level Math (MATH 3-5-7) and Physics (PHYS 1B-1C-1D) enrollments. Engineering has a growing concern about the support and relevancy of their program. New curriculum that clarifies pathways and offers certificates and degrees may mitigate some of these concerns.

GEOG requests an increase in the supply budget to incorporate technology changes into courses. The program has an annual budget for ArcGIS software licenses. The IER process is an avenue for instructional equipment.

VIT requests an equipment maintenance budget line and additional space. Staff attempts repairs and/or works with the Dean and business office to find funding. A budget for maintenance of the vineyard has been set aside; this needs to remain in place to meet MOU requirements.

### **g. Human Resources**

Hiring and staffing needs.

Faculty, classified (especially lab technicians). The turnover rate of lab technicians has a detrimental effect on program efficiency, requiring time of faculty and staff to serve on hiring committees, and leaving teaching labs with less support during a vacancy. A review of this issue is important. Upcoming retirements of experienced faculty over the next 1-3 years poses a challenge. An unfilled Math position has been vacant for 2 years, placing heavy demands on the math program to prepare and implement AB 705. Full-time hiring needs exist in BIO, CHEM, CS, and MATH. Fortunately, recent new FT faculty hires have been outstanding. Onboarding of part-time faculty occurs at the beginning of each regular term, but is limited to a 2-hour orientation. Additional onboarding is done within programs. The ratio of FT/PT is low in several disciplines. Student assistants have been utilized more often to support programs.

BIO requested for 2 years a new FT faculty member in Allied Health; this was not funded. Despite recent full-time hires, the department's continued growth of sections has resulted in a low full-time to part-time faculty ratio. The program projects the need to hire full-time faculty in Biotechnology to help develop a Biotechnology program and a new full-time faculty in the Biology majors area. This has not been requested yet because there are more urgent needs for new hires for current biology programs. There is a need to hire more lab technicians to support additional labs, especially for evening and night classes.

## Program Review Update Division Summary 2019

CHEM successfully hired two new full time faculty: one replacement, one new. The program submitted a request for a 5th full-time faculty position, but this request was not fulfilled due to the College's budget constraints and other emergency replacements. Without this new position, less than 50% of our classes will be taught by a Full Time Professor. The Coordinator Position received an increase in CAH allocation from 0.7 to 1.0 per semester, which is not sufficient for the amount of time required 12 months per year. The department requests an increase to 4.0 CAH. In reality, there is easily 10-15 hours per week of time spent on the position, including summer, which is not compensated. In order to continue to grow and to accommodate an increasingly packed schedule in our laboratories, Chemistry need to continue to increase our laboratory technician support staff. There is one vacant laboratory technician position among 5, with 2 hired in the last year.

COMPUTING STUDIES note that some instructors teach 4 to 5 courses a semester to meet minimum full load, which is too large a load.

ENGR: A new STEM coordinator was hired in Fall 2019, covering some of the functions of the grant-funded Student Support specialist (SSS) position. The SSS was critical to managing the Engineering Technology program. The program expresses concern about unit inflation, related to the Full time Engineering instructor teaching load.

GEOG does not have the need another full-time faculty member, based on enrollments and demand data. The number of part-time faculty has been consistent. A lab technician shared with geology has been hired, to replace someone who retired.

GEOG requests an increase in release time.

HORT requests an increase of the lab technician position from 50% to 100%, or the addition of another part-time lab technician position. The lab technician plays a vital role working in partnership with the faculty in the success of students in the horticulture and viticulture programs. They support students in the lab and the field. The current lab technician cannot keep up with the workload for both Viticulture and Horticulture. Maintenance of the horticulture facility (i.e. weed and disease control) is being completed by part-time faculty, who are not compensated for the work. The program proposes to hire a full-time faculty to teach Horticulture.

MATH has recently hired a full-time senior instructional assistant and a replacement 10 hr/week IA to help with running and overseeing the operations for Math Emporium, which requires intrusive help for students. The recent new position of STEM Coordinator is necessary to sustain Math Jam and other important initiatives within the STEM Division. The vacant FT math faculty position needs to be filled, and a new FT faculty needs to be added. Several new part-time faculty have also joined department, which is typical each semester. The mathematics department is in need of support from instructional assistants to support the expected growth in our concurrent support courses. Once the HSI grant ends in October 2020, there will be no more reassigned time for coordination of the Math Emporium, Concurrent Support, or Math Jam. All of these areas require extra time and commitment outside of a faculty member's usual professional responsibilities.

OSH-RADS has a new adjunct faculty member to co-instruct Spring 2020 class.

VIT needs more faculty and faculty diversity. Having a single faculty member has impacted enrollments. Faculty member is on sabbatical this fall, two new faculty were hired to teach classes, but there were reduced number of offerings because there is no faculty coordinator. New hires will revert to the part-time pool when faculty returns from sabbatical. Lab technician position should be increased from 50% to 100%.

## **h. Learning Support**

2/24/2020

## Program Review Update Division Summary 2019

Services provided to support student learning, such as tutoring and library support.

Support is needed for embedded tutoring. New noncredit courses in NMAT attempt to address this need. Faculty are involved in Smartshops and offer office hours at the Tutoring Center.

BIO full time and part time faculty ran Smartshops on the metric system, navigating the bio major, dissecting a scientific paper, and using microscopes. The Biology Center (BLC) is increasingly impacted as more BIO sections are added. The resource contributes towards success rates in Anatomy and Cell and Molecular Biology.

CHEM continues to serve students through instructor office hours in the Tutorial Center.

GEOL: The program mentions a lack of support for geology tutoring through the LPC Tutorial Center, although no specifics are detailed. Could geology majors be recruited to act as tutors?

MATH: Math Jam (discussed extensively in curriculum section) is now a noncredit program with noncredit certificates, and new Math Jam credit courses prepare students for all levels of Calculus. These new Math Jam courses were offered for the first time in Fall 2019. The Integrated Learning Center/Math Learning Center in Room houses concurrent support classes. SMART Shops are now encouraged by many of our math instructors, for credit or extra credit. The department developed and began offering in Fall 2019 concurrent support courses for multiple levels of our math courses (Math 107 through Math 3), in which students get regular, effective and just-in-time help with their target math courses. The data has not been analyzed, but feedback from current students has been positive. The program submitted two SCFF Proposals. Proposal 1 (approved) is Persistence, Retention and a Community of Practice and Proposal 2 (not approved) is Concurrent-Support Support that proposes to hire two Temp On-Call Instructional Assistants (IAs) to help increase student enrollment in our concurrent support courses.

### **i. LPC Collaborations**

Collaborative projects bringing together different programs/areas within LPC.

There are strong collaborative relationships within STEM and between STEM programs and the rest of the college and District. This work includes the STEM Matrix which optimizes when to offer courses at times so students can take multiple STEM courses. Partners across campus include Student Services and Administrative Services, and other Academic Divisions, as well as Library, Tutoring, DSPS, Counseling, A&R, Middle College, Veterans, IT, Campus Safety, Institutional Research, and SEA. There are several Learning Centers/Spaces shared by programs (Math, Bio, Chemistry Instrument Room, MakerSpace).

BIO is examining, as part of Guided Pathways, degree requirements, course scheduling, and potential completion barriers for students. This often requires extensive collaboration with faculty in other disciplines that offer courses required for biology degrees and certificates. This is a short and long term goal. The department would like to learn more about, and hopefully decrease, potential areas of inequity for students in our programs. This will involve collaboration with adjunct faculty, the Student Equity committee, and the Office of Research, Planning and Institutional Effectiveness. This is both a short and long term goal.

CHEM continues to work extremely well with the Library staff to update materials including reserves, reference books, and online databases. The department needs greater institutional support to ensure that all online course content (e.g., in Canvas) are web accessible.

GEOG: A college wide committee was formed to examine cheating in regular and online course and how to combat the problem. Changes were made to the Geography 1 DE course. Weather station data may be interesting to campus.

## Program Review Update Division Summary 2019

GEOL has worked to create on-campus collaborative projects, such as the Augmented Reality Sandbox, which is a hands-on, interactive way for students to learn and experiment with the concepts of 2D vs 3D representations/maps. This new AR Sandbox is already being utilized in both Geology and Geography laboratories (and occasionally lectures). The AR Sandbox was a collaborative maker-space type of project for students across several disciplines (e.g., engineering, computer science, etc.). The program shares a common area (1824) with other departments.

HORT wants to collaborate and integrate part-time faculty into the planning process. Outreach to the developmentally disabled community is incredibly complicated because it involves different School Districts, and public and private agencies. Support from DSPS and Adult Education has been limited recently due to recent turnover.

MATH: The Math Department is dedicated to Middle College and ensuring that high school students have a positive experience in math classes. Engineering Tech Cohort has an accelerated math component where students complete Intermediate Algebra, College Algebra, and Trigonometry in two semesters. This section has also been heavily contextualized in STEM applications and has a strong learning community component. It has been highly successful in terms of success and retention. A large number of new courses, pathways and certificates were introduced; the department faced a number of obstacles in implementing these courses through Banner; for example, a coding issue prevents enforcement of the co-requisite requirements for concurrent support courses as indicated on their course outlines of record. The program requests additional support from Academic Services to offer these classes as were designed and approved.

### **j. LPC Planning Priorities**

Available here: <https://goo.gl/LU99m1>

Topics in LPC Planning Priorities are covered in other section (equity, guided pathways, and accreditation).

BIO created a UC Transfer Degree designed for biology majors. Most biology majors already satisfy the degree requirements, so the program plans to advertise the degree application. Increasing the number of degrees achieved supports the SCFF.

### **k. Pedagogy/Teaching Methods**

The process of teaching students. Not limited to instructional programs/ areas. Might include teaching/counseling/tutoring methodology, class activities or course design.

Innovative pedagogy in STEM fields is part of the Division's culture. The Faculty Learning Program (FLP) about Active Learning through CSUEB has graduated more than a dozen FT and PT STEM faculty.

BIO: Biotech Bootcamp was offered for a third year in Summer 2019. BIO 55: Orientation to Healthcare was offered spring 2019, providing in-depth exploration of the varied careers available in health care. BIO 50 is still under development to become the program's first laboratory course taught entirely online. The intent is to make it OEI compliant and ready for 2020. Biology enrollments increased Fall, 3% and Spring, 7%. There was an increase in LatinX students, but this population had a lower success rate and higher withdrawal rates than white or Asian students. Overall, biology success rate is 73.1%, well above the program set standard of 64%.

CHEM: needs updating of lab curriculum to improve the quality of the course content, reduce environmental waste, and minimize the cost of materials. Large changes to curriculum are difficult to research and implement. The program would like to create a non-major courses to support science GE, such as Environmental Chemistry, Chemistry and Society, or Brewing Chemistry.

## Program Review Update Division Summary 2019

MATH: Some of our face-to-face instructors have focused on infusing their sections with more active learning and growth mindset language and attend monthly Friday Math Initiative Meetings. The Emporium mode includes streamlined learning that focuses on each student individually and customizes the work to what they need to master while infused with learning supports such as growth mindset and study strategies.

### **I. Professional Development**

Activities and resources to enhance employee knowledge and skills.

There is active participation in professional development by members of the STEM Division. Professional Development Committee approval of proposals and STEM PD funds have supported nearly all requested activities. One important goal is to encourage more faculty to participate in PD, especially in relation to equity and innovative, effective teaching and support. There are no funds available to pay for subs when faculty are at conferences, which deter participation or could have negative impact on student learning when faculty are away. Classified professionals participate less in professional development since there is an impact on services provided, but professional growth is an important value to the Division and college. Continued Guided Pathways and Equity training are continuing needs for the Division.

BIO plans to research and develop an “on-boarding” program for newly hired part-time faculty.

MATH department members have attended many workshops, conference breakouts, and webinars, as well as collaborated with many other math departments across the state to plan for the massive redesign due to AB 705. Professional development remains an ongoing issue in the department. The urgency for more training depends on several factors, including the course being taught (those most affected by AB 705 are in greater need of additional support) and the level of experience each instructor brings to the specific course. The department has started a monthly community of practice for concurrent support instructors and a SCFF project was approved for more professional development for part-time faculty to begin next year. Faculty (especially part-timers) need professional development in active learning and best practices in teaching math. Faculty should be encouraged and incentivized to change their teaching styles to better suit the needs of our students. An example of how to incentivize professional development has been to encourage part-time faculty to participate in meaningful, directed professional development as part of their required professional responsibility hours each semester. Active learning workshops such as OnCourse should be offered and encouraged on Mandatory FLEX day, instead of ad-hoc during the semester.

VITICULTURE needs training on how to run a Foundation on top of the academic program.

### **m. Services to Students**

Non-instructional services provided to students. Not limited to Student Services programs/areas.

There is a wide variety of programs that serve students outside of classes; these include Seminar Series, Poster Session, Guest lectures, Clubs (Math, Biology, Chemistry, Engineering, Computer Science), Honor Societies (Math, Biology).

MATH: The Math Club/Honor Society is highly engaged. Students regularly attend and the president was a keynotes speaker at the Tahoe CMC<sup>3</sup> conference spring 2018. The club has regular meetings including talks by faculty, and has hosted a series of Math Public Lectures with speakers from local industry. AMATYC Exams are offered each fall and spring semester, with up to 150 participants each year. LPC students have consistently performed well with LPC placing 7th in the nation in 2018. Math Department Scholarships are awarded from donations by math faculty to students ranging in math sophistication and who have shown true academic integrity and passion. The program offers a Math Jam Excellence in Tutoring Scholarship.

## Program Review Update Division Summary 2019

OSH-RADS faculty have provided certificate and AS degree information to students enrolled in core program.

### **n. SLOs/SAO Process**

The process of creating, recording and assessing SLOs/SAOs (not the SLO findings; those could appear under pedagogy, curriculum, enrollment management, equipment, etc., as applicable).

SLOS work across STEM programs are up to date, requiring a lot of hard work. The STEM Division has done a great job meeting accreditation requirements. There are differing levels of engagement and understanding of impact of SLO process on programs. The Division would benefit from continued support and sharing of best practices and outcomes so that the SLO process is personally and professionally meaningful.

BIO: Course (SLOs only): BIO 7A (Human Anatomy) - The anatomy faculty will meet to develop a common format for assessing comprehensive and applicable knowledge gained throughout the semester and to be assessed using a final comprehensive practical exam.

CHEM just completed mapping, SLO wording revision, the SLO catalog, automated course reminders, and planning. All courses have SLOs.

ENGR plans to get SLO information more up-to-date, including CSLOs and creating meaningful PSLOs. ENGR is up to date in creation of SLOs, and needs to modify and update several SLOs.

GEOG 15 needs to increase the number of SLOs in the future. The part time instructor for the class was contacted to create 2 additional SLOs.

GEOL courses all have approved SLOs. Course SLO - GEOL 1 resulted in more study guides and study skills integration into the course. Program SLO - AS-T Geology, resulted in additional practice being encouraged, and more time spent on simpler geologic histories before moving on to more complicated histories.

HORT: Course (SLOs only): Hort. 51 Fall Plant Materials.

MATH classes all have SLOs written; a few need SLOs entered into eLumen and approved by the committee. Course (SLOs only): Math 5 - Ordinary Differential Equations; Course (SLOs only); Math 1- Calculus I; Course (SLOs only): Math 39 - Trigonometry; Course (SLOs only): Math 40 - Statistics and Probability; Course (SLOs only): Math 50 - Intermediate Algebra for SLAM

OSH/RADS: Course SLO - OSH 67 Expected results were met. Program SLO - AS, OSH - Students met/exceeded program expectations; will incorporate more group work into the program. Following classes do not have SLOs - RADS 40A/B/C.

PHYSICS AND ASTRONOMY: Course SLO - Experienced low SLO scores for ASTR 10 /20 - assessed the use of quantitative reasoning to assess relationships between physical quantities in astronomy. Resulted in exploring creative ways to teach and use mathematical equations in astronomy courses. Program SLO - Physics AS: The faculty found that there are higher than average SLO scores for Phys 1A and relatively large number of students not passing Phys 1B. Result - Physics 1A instructors will set higher standards for passing grades.

VITICULTURE Needs SLOs for VWT 1/2/23/55.

### **o. Student Equity**

Actions taken to increase equitable access and outcomes for underserved groups.

## Program Review Update Division Summary 2019

Departments care and have concern about equity, some have done analysis, and all would benefit from professional development and guided assistance with understanding how to address equity. It is important to ensure that equity work remain a positive endeavor, not a “task.” Professional development would help departments determine what data is available, how to access and interpret data, and how to make it meaningful. The SEA program is potentially a good source of assistance to help programs assess and understand equity work.

BIO lists 8 actions taken in section G1. Lists 5 challenges in G2. Two full time faculty members and the Dean participated in the NSF Mentor Connect grant writing workshops. They subsequently wrote a grant proposal for the NSF Advanced Technical Education program. The proposal will increase biotechnology skills in the curriculum while also addressing equity gaps. There is still no budget for Honors and Independent Study Projects, creating an inequity of opportunity. The department would like to learn more about, and hopefully decrease, potential areas of inequity for students in biology programs. This will involve collaboration with adjunct faculty, the Student Equity committee, and the Office of Research, Planning and Institutional Effectiveness. This is both a short and long term goal. Actions included writing grant to focus on equity gaps, moving class sessions to evening to accommodate working students, faculty holding office hours in tutoring center, adopting the same textbook adopted for Bio 1 series ABC, and joint work of BIO 30 faculty on intro lab.

CHEM continues to offer at least 10 hours per week of office hours by Faculty in the Tutorial Center in order to continue to help students who need our support in reaching their goals. Faculty wrote a SCFF proposal to subsidize funding for the ACE train for students coming from the Central Valley; this would remove barriers from students moving towards their goals and hopefully increase the completion of degrees, certificates, and transfers. Unfortunately, the proposal was not approved.

ENGR shows an increase in the number of women enrolled as Engineering majors.

GEOG 2 course includes units that deal with race / ethnicity. Geography has used discussions, group work and individualized assignments to promote diversity in the classroom.

HORT has specifically reached out to the developmentally disabled community though noncredit horticulture program and has successfully transitioned two of these students into the credit horticulture program. Outreach to the developmentally disabled community is complicated, with numerous public and private partners. Support from DSPS and Adult Education has been limited by recent turnover in their leadership.

MATH Honors Projects are available to students in transfer level math courses, allowing students the opportunity to complete a challenging application in their target course, earn honors credits that are transcribed and transferable. The Calculator Rental Program allows students to rent a graphing calculator, worth around \$120, for \$30 for the semester. The program provides an affordable alternative to purchasing. The math program is considering how much more the cost can be lowered while keeping the program sustainable. Math Faculty were surveyed to determine what types of training they have completed recently. Twenty-six part-time and 11 full-time faculty responded. A small portion (22%) of our faculty participated in the “Teaching Men of Color” training from two years ago, while 49% have received some form of Equity-centered training. Sixty-two percent of faculty have participated in active learning training to improve teaching, and 76% have implemented active learning strategies in their classrooms. Several faculty have implemented Growth Mindset teaching and grading strategies in the classroom, and these permeate concurrent support courses and Math Jam courses. One of the most significantly impacted groups specifically for math is the African-American population. The program is working to help faculty identify best practices in teaching students, specifically our students of color. Several faculty are involved in

## Program Review Update Division Summary 2019

Equity and sharing resources and strategies to other faculty to begin improving our teaching and approachability for students.

PHYSICS AND ASTRONOMY: The largest challenge with equity is securing information about equity gaps. Overall, any student who identifies other than white is experiencing lower success rates. There has been no changes in enrollment trends for female vs. male students.

### **p. Technology Use**

How technology is used to instruct/serve students or for other college functions.

STEM program use of discipline-specific technology is too extensive to list; these include all the instruments, computers, hardware, software, apparatus, machines, equipment, and tools used for teaching and learning. The LPC IT team has been highly supportive of hardware and software needs. Some software licenses are integrated into department budgets. There is a college-wide need to increase the number and availability of IT staff, especially to provide evening coverage instruction.

CHEM requests help converting course outlines and Canvas content to be web-accessible.

### **Suggestions for Improving Program Review**

Below, please describe any suggestions for clarifying or strengthening program reviews. Please note the program name and section number along with the suggestion.

- Can the forms for writers, readers, and deans be exactly the same? This could streamline the process for everyone.
- Google Doc format – Can this be streamlined so programs can enter information directly into a Google Doc? Create sections for narrative, SLOs, Curriculum and Resource Allocation, Equipment
- What curriculum is new? Changes? Issues getting approved?
- Perhaps some of the areas and themes can roll-up into other areas; for example under Resource Allocation: “we need more resources so that we can do these outreach activities....”
- Course Offerings should be Enrollment Management (Increased sections of this class, etc.)
- Learning support
- What is your technology need and explain why you need it?
- Consider renaming LPC Collaborations “Collaborations within LPC.”
- Planning priorities feels redundant.
- The theme Pedagogy/Teaching Methods section, is not clearly discussed by the writers since it is not a section in the program review. What is the purpose of this question?
- The theme Services to Students would be easier to discuss as a writer if this theme was asked to be elaborated in the writer instructions. It might be good to have a description of what this could entail, clubs, lecture series, etc.
- The questions about equity could be streamlined and more pointed.
- We found the technology question vague, it might be better served if the writers/readers knew more how the question would be useful.
- In the forms for writers, can direction be given to support an organized focus on highlights. For example, can bullets or lists be encouraged, with optional narrative or description. This could help writers summarize their main points.
- Non-Instructional Services could benefit from clarification; clubs, events, and lectures can be suggested. What do we want to learn from this?
- Support was given for program review writing in spring. This would help programs prepare requests that are due in fall.



## Program Review Update Division Summary 2019

- ENGR would like access to transfer data and to determine how much Math enrollment can be attributed to engineering majors.