



## ANNUAL PROGRAM REPORT

Academic Program	Sciences and Mathematics
Reporting for Academic Year	2020 - 2021
Department Chair	Cynthia S. Trevisan
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### **1. SELF-STUDY (about 1 page)**

#### **A. Five-year Review Planning Goals and B. Goals Progress**

Since our last Program Review (2013), our program achieved the following goals: The chemistry program replaced its *Chemistry I* class with two specialized chemistry classes: *Introductory Chemistry*, and *General Chemistry*. It also created a new course for Oceanography majors: *General Chemistry 2 lecture and laboratory (CHE210/210L)* to be offered beginning spring 2021. A new course CHE340 - Introductory Biochemistry is also in development.

A math minor was created, which included the development of the following new classes: *Introduction to Linear Algebra*, *Complex Analysis*, *Probability and Statistics*, and *Introduction to Partial Differential Equations* and *Quantum Mechanics*. With the hire of Dr. Setniker, a redesign of our department's introductory math curriculum was launched. This includes the coordination and redevelopment of our College Algebra and Trigonometry (MTH 100) course, the creation of a MTH 100 Student Workbook oriented around active learning, the creation of common final exam questions, the coordination of different MTH 100 instructors, and the mentoring of undergraduate teaching assistants. A free-to-students online homework initiative was also launched in the use of WeBWorK for the majority of mathematics courses.

One new class was created in the physics program: *Physics for Future Leaders*. No progress was made towards creating a minor in physics. A new physics course and laboratory were created for Oceanography majors: *General Physics II* and *General Physics II Lab*, was offered for the first time in spring 2021. The student contact hours of *General Physics I Lab* and *Physics II Lab* was increased from 2 to 3 to better meet student learning outcomes. This change does not involve increasing the unit count of these labs and are to be implemented in the fall of 2022.

The following five classes were created in the oceanography program: *Introduction to Oceanography (Area B1, non-major)*, *Environmental Sustainability (Area E, non-major)*, *Marine Invasions*, *Fisheries Oceanography*, and *Air-Sea Interactions*. The OCN Program also revised the minor requirements to better align with the growing major. The minor now includes 16 units of course work, up slightly from 15 units previously.

Work on the oceanographic buoy, to be sited in San Pablo Bay, continued. During the AY 2020-2021 the project team, led by Drs. Cifuentes-Lorenzen and Randolph in collaboration with Dr. Tomas Oppenheim, continued to build the buoy system and have engaged five OCN and ME students in that effort. The effort was slowed substantially due to COVID-19 and a lack of dedicated lab space for construction of the large instrument package.

During Spring 2021 the OCN Program faculty, led by Dr. Parker, submitted a Presidents Mission Achievement Grant proposal to develop an NSF GEOPaths proposal to support OCN students from diverse backgrounds with curricular and co-curricular activities.

## **B. Program Changes and Needs**

Tenure-track faculty changes since our last review follow in all programs:

- 2019 – Dr. Ariel Setniker, Assistant Professor, Hired
- 2019 – Dr. Nelson Coates, Assistant Professor, Resigned
- 2018 – Dr. Alejandro Cifuentes-Lorenzen, Assistant Professor, Hired
- 2018 – Dr. Abigail Higgins, Assistant Professor, Resigned
- 2017 – Dr. Abigail Higgins, Assistant Professor, Hired
- 2016 – Dr. Matthew Fairbanks, Assistant Professor, Hired
- 2015 – Dr. Julie Simons, Assistant Professor, Hired
- 2015 – Dr. Ryan Smith, Assistant Professor, Resigned
- 2014 – Dr. Ryan Smith, Assistant Professor, Hired
- 2014 – Dr. Nelson Coates, Assistant Professor, Hired
- 2014 – Dr. James Wheeler, Professor, Retired
- 2013 – Dr. Alex Parker, Assistant Professor, Hired
- 2013 – Mr. Lloyd Kitazono, Professor, Retired

Changes and needs in the marine science program:

While serving students in online learning during AY2020-2021, we did not directly experience any challenges with facilities and space. OCN students did have some challenges feeling connected to campus and co-curricular activities such as the Corps of Cadets. Students who entered the program in Fall 2020 were not able to take part in the hands-on aspects of the curriculum design and efforts were made to increase opportunities for these students during AY2021-2022. The OCN Program was told that the previous arrangement of working with the MT department to use the MV Cub was no longer a viable approach for OCN access to the water. The program has been working to secure use of San Francisco State University's *R/V Questuary*. Additionally, the program has been challenged with a lack of lab space for student / faculty research projects, especially larger instrument packages, such as the oceanographic buoy. We will need additional lab space both for teaching and research.

Changes and needs in the chemistry program:

A second semester of general chemistry (CHE210/210L) has been created. Currently, the lab space available is sufficient to support one section of CHE210L along with existing sections of CHE110L and CHE105L, though additional budgetary support is needed for additional chemicals and supplies. If enrollment increases in the Oceanography program offering more sections of CHE210L, new lab space and equipment may be required.

Changes and needs in the mathematics program:

A minor in mathematics was created (see previous section). Three Provost Curriculum Redesign grants were awarded to faculty members teaching mathematics in our Department. One of the

grants was used to design a recitation/lab model class as a co-requisite to our entry-level math course, College Algebra and Trigonometry. This approach was taken to help under-prepared incoming students and to comply with Executive Order 1110 (EO 1110). EO 1110 requires campuses to eliminate remedial mathematics and English courses that do not offer college credits to students. Another grant produced worksheets that incorporate active learning techniques in class activities for Calculus I. The third grant was used to establish the curricula for a cross-disciplinary project that links activities between an Elementary Statistics course and a Critical Thinking course. A Chancellor's Office Student Cohort Transitions Program grant was awarded to Dr. Setniker to fund the creation and first semester supply of the aforementioned MTH 100 workbooks. The mathematics faculty have made a concerted effort to provide a zero cost online homework platform to students. Thus far, faculty have achieved this through making use of pilot programs on other campuses and, most recently, partnering with sister CSUs. However, this cannot continue indefinitely and further presents numerous limitations in creative control. The ultimate answer to these issues is a local WeBWoRK server on campus. This could easily be run in-house by a mathematics faculty member under a small amount of designated release time.

Changes and needs in the physics and computer science program:

As our student population increases and these programs develop new offerings, faculty hires and lab equipment will be needed.

Need for all programs: student graders to help alleviate the high grading workload of professors and benefit students by providing earlier feedback on performance.

## **2. SUMMARY OF ASSESSMENT (about 1 page)**

### **A. Program Student Learning Outcomes**

#### Sciences – Student Learning Outcomes (SSLO)

1. Understand scientific principles and their relationship to the physical universe. (IWSLO-B, D)
2. Use theories, principles and models, in conjunction with the scientific method to analyze problems in science. (IWSLO-B, C, D)
3. Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in science. (IWSLO-B, C, D, G)
4. Effectively communicate scientific information in a way that is meaningful and convincing (IWSLO-A, F)

#### Mathematics – Program Learning Outcomes (MPLO) – updated summer 2020

The mathematics program SLOs were updated over Summer 2020 to map simultaneously into the CSUM ILOs as well as the CSU-wide GE Mathematical Learning Outcomes, to provide more clarity to the instructors carrying out the assessment of said SLOs, and to maintain clear consistency across instructors. In order to meet these goals, all CSUM mathematics faculty collaborated on a rubric to assess the 5 programmatic SLOs, categorized into introduced, developing, or mastery level meeting of the SLOs. This is unique in that not every course will be expected to meet at the mastery level; rather faculty will be allowed to assess both a single course and the entire program via the same rubric. These SLOs also maintain the key components of mathematical outcomes while refraining from unnecessary specificity:

1. **Reason** mathematically.
2. **Solve** complex problems using mathematics.
3. **Communicate** mathematical ideas.
4. **Create** mathematical models from context.

5. **Evaluate** mathematical work.

Oceanography – Program Learning Outcomes (OCN-PLO) mapped to Cal Maritime ILO

1. Apply knowledge of foundational concepts in physics, geology, chemistry, biology and mathematics to the study of oceanography. ILO C,E
2. Employ the scientific method to solve problems in oceanography by formulating hypotheses, making predictions, and collecting, analyzing, and interpreting data. ILO B,C,E,F,
3. Demonstrate mastery in the use of modern oceanographic laboratory, field, and data processing techniques, including a working knowledge of modern instrumentation and computer programming. ILO C,E,G
4. Effectively communicate concepts in oceanography and original research findings to diverse audiences, both verbally and in writing. ILO A,D,F
5. Evaluate information and apply critical thinking to make informed and responsible decisions about ocean stewardship as a local, national and global citizen. ILO B,F,H,I.

**B. Program Student Learning Outcome(s) Assessed**

During the 2020-2021 academic year, formal assessment of MPLO-1-5 and SSLO-3 were conducted.

**C. Summary of Assessment Process**

Department SLOs are assessed at the course level. Instructors gather assessment artifacts and apply an assessment rubric developed by the instructors and the department. Each instructor summarizes assessment results in a formal assessment report that is collected by the department chair. Assessment reports and data can be found in the department OneDrive assessment folder.

**D. Summary of Assessment Results**

Currently, not all instructors have submitted reports for all courses during the 2020-2021 academic year which does not necessarily reflect a lack of assessment for all courses, though compared to previous years, the number of courses providing assessment reports has improved markedly. Due to the incomplete record of assessment, it is difficult to interpret general trends for the results. Results are summarized in the following table. Values represent the percentage of students achieving 4 or better on a 6-point rubric.

COURSE	term	SSLO-3	MPLO-1	MPLO-2	MPLO-3	MPLO-4	MPLO-5
CHE110	FA20	46.4					
MTH100	FA20			96.0			
MTH205	FA20			97.0	94.0		
MTH210	FA20		75.0	63.9		50.0	50.0
MTH211	FA20		85.7	85.7		81.0	81.0
MTH212	FA20			72.2			
MTH250	FA20			83.3			
PHY200	FA20	28.0					
PHY205	FA20	47.4					
CHE105	SP21	25.0					
CHE205	SP21	83.0					
CHE210	SP21	75.0					

MTH107	SP21	66.7	66.7	93.3		
MTH211	SP21	52.0	88.0	68.0	84.0	84.0
MTH215	SP21		45.5			
PHY205	SP21	47.0				

We continue to streamline data collection via our Learning Management System. We have been successful improving the process for providing data to the Institute-Wide Assessment Council but have yet to successfully streamline submission of course assessment reports using the LMS. Given the lack of historical data, it is not possible at this time to identify any trends in student learning outcomes. It is worth noting that the 2020-2021 academic year occurred exclusively online due to the COVID-19 pandemic, and it will be useful to compare trends of in-person learning to the online learning environment.

### **3. STATISTICAL DATA**

Statistical data is meant to enhance and support program development decisions. These statistics will be attached to the Annual Report of the Program Unit. This statistical document will contain the same data as required for the five-year review including student demographics of majors, faculty and academic allocation, and course data.

<b><i>Program</i></b>	Fall 2021
<b><i>A. Students</i></b>	
1. Undergraduate	32 (Oceanography)
2. Postbaccalaureate	NA
<b><i>B. Degrees Awarded</i></b>	0 - Oceanography program launched in 2020
<b><i>C. Faculty</i></b>	
<b>Tenured/Track Headcount</b>	
1. Full-Time	9
2. Part-Time	0
3a. Total Tenure Track	9
3b. % Tenure Track	56.2
<b>Lecturer Headcount</b>	
4. Full-Time (lecturers with WTUs $\geq 15$ )	2
5. Part-Time	5
6a. Total Non-Tenure Track	7
6b. % Non-Tenure Track	43.8
7. Grand Total All Faculty	16
<b>Instructional FTE Faculty (FTEF)</b>	
8. Tenured/Track FTEF	8.38
9. Lecturer FTEF	4.00
10. Total Instructional FTEF	12.38
<b>Lecturer Teaching</b>	
11a. FTES Taught by Tenure/Track	111.9
11b. % of FTES Taught by Tenure/Track	65.0
12a. FTES Taught by Lecturer	60.2
12b. % of FTES Taught by Lecturer	35.0
13. Total FTES taught	172.1
14. Total SCU taught	2,581
<b><i>D. Student Faculty Ratios</i></b>	
1. Tenured/Track	13.4

2. Lecturer	15.1
3. SFR By Level (All Faculty)	13.9
4. Lower Division	15.1
5. Upper Division	3.4
<b><i>E. Section Size</i></b>	
1. Number of Sections Offered	58
2. Average Section Size	16.9
3. Average Section Size for LD	18.4
4. Average Section Size for UD	4.0
6. LD Section taught by Tenured/Track	32
7. UD Section taught by Tenured/Track	5
8. GD Section taught by Tenured/Track	0
9. LD Section taught by Lecturer	20
10. UD Section taught by Lecturer	1