

**Quinebaug Valley Community College
Academic Affairs
Five-year Discipline Review: 2019-2020**

Biology, Chemistry, Environmental Science, Oceanography, Physics

1) Mission Statement

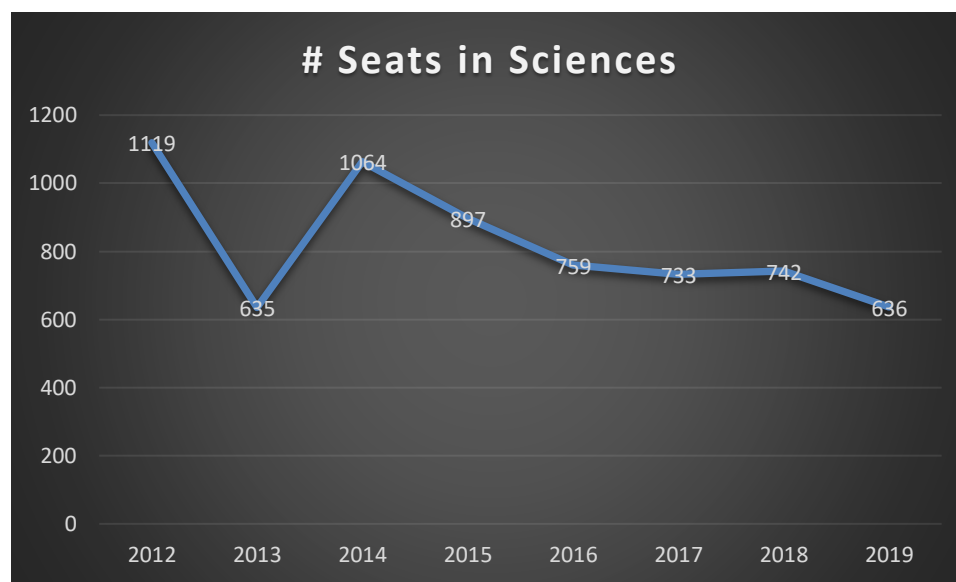
a. List the mission statement of your discipline.

The science department supports the mission of the college by providing courses in the sciences. The science program at Quinebaug provides courses in Biology, Chemistry, Physics, Environmental Science, and Oceanography. We provide courses to support the various programs at the college as well as, our general education core competencies. Our courses are created to allow for transfer to our receiving institutions and are maintained and updated in accordance with system wide college objectives. All courses are reviewed and evaluated regularly and updated as appropriate through QV's curriculum committee within our Academic Senate, CIP.

2) Historical Enrollment Data

Academic Year	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Total # Sections	52	55	49	37	34	37	37	37
Percent Change	--	+ 5%	-11%	-35%	-9%	+9%	0%	0%

Courses in the Sciences over the past 4 years have remained somewhat consistent between 2016 to 2020. The biggest change was a downtrend from the years between 2012 to 2015 in which we dropped approximately 30%. This also corresponds with a loss of one full time science faculty member who taught in the Geology/Astronomy/Physics discipline. While we kept offering those Physics courses and have them taught by Engineering Faculty, we never hired a replacement faculty member nor did we bring many of those course sections back (Geology, Astronomy).



Seats in the science course have trended downward (with an unexplained anomaly for 2013). As enrollment has been dropping at both QVCC and the system overall, this is not unexpected. We have been slowly working on increasing our enrollment with additional winter and summer intersession courses offered in 2019-2020. Student services is currently creating an enrollment management plan to

examine enrollment at the college. Department wide, we have been continuing to offer courses in all formats (evening, daytime, online, summer and winter intersession) to provide flexibility for our students.

Much of our enrollment of basic sciences came from nursing students taking their pre-nursing course requirements. While nursing enrollment is up state wide (18.4%), nursing enrollment for UConn programs as well as Central CT is down overall (<https://www.cga.ct.gov/2008/rpt/2008-R-0444.htm>) Many of our students who enrolled in courses at QVCC would come from students entering these undergraduate programs.

3) Curriculum Review

a. List all courses specific to your program/discipline that are in the catalog or have been offered anytime in the last three years. Note the semester each course was taught.

BIO 121 General Biology – Offered every semester, Fall, Spring and Summer
BIO 115 Human Biology - Offered Fall and Spring semesters
BIO 211 Anatomy and Physiology – Offered Fall and Spring semesters
BIO 212 Anatomy and Physiology II - Offered Fall and Spring semesters
BIO 235 Microbiology - Offered Fall and Spring semesters
CHE 111 Concepts of Chemistry – Offered Fall and Spring semesters
CHE 121 General Chemistry 1 – Offered Fall and Spring semesters
CHE 122 General Chemistry II - Offered alternate years in Spring or Fall semester
EVS 105 Environmental Field Lab – Offered Fall semester
PHY 121 General Physics I – Offered Fall semester
PHY 221 Calculus Based Physics I – Offered Fall semester
PHY 122 General Physics II - Offered Spring semester
PHY 222 Calculus Based Physics II – Offered Spring semester

BIO 111 Introduction to Nutrition – Offered every semester, Fall, Spring, Summer (and Winter 2019)
BIO 123 Biology of Human Disease – Offered Fall and Spring semesters
EVS 100 Introduction to Environmental Science - Offered Fall and Spring semesters
OCE 101 Introduction to Oceanography - Offered Fall and Spring semesters
SCI 103 Recent Discoveries in Science – Offered Fall and Spring semesters

b. Is there a syllabus on file in the Academic Affairs Office for each course specific to your program that includes course outcomes and processes for assessment?

Yes, all faculty provide syllabi each semester to the Academic Dean's office for record keeping. These files are maintained on our internal drive for access to Faculty and Staff. Syllabi should contain both the accepted course outcomes outlined and approved by the Curriculum Committee (CIP) as well as, the General Education Outcomes for the system for those courses identified in our General Education Core. The courses identified to be acceptable for our General Education Core and for the TAP competencies are regularly assessed using these objectives.

c. *List any online classes in your discipline. How often are each offered, and what are the plans for future online classes? What is the rationale for this plan?*

BIO 121 General Biology – Offered online in the summer semester
BIO 115 Human Biology - Offered in online/hybrid format each semester
BIO 211 Anatomy and Physiology – Offered in hybrid format in the summer
BIO 111 Introduction to Nutrition – Offered every semester online Fall, Spring, Summer
BIO 123 Biology of Human Disease – Offered Fall and Spring semesters online
SCI 103 Recent Discoveries in Science – Offered Fall and Spring semesters online

Future online offerings should include more laboratory science courses taught online with laboratory kits during the regular semester to meet the needs of students entering Allied Health field and students who are learning primarily online. With the push to consolidation, more online offerings could meet the needs of students throughout the system and would be likely to enroll as they would now be open to all students.

4) Discipline Delivery Strategies

Are the discipline semester course sequences listed in the catalog?

Because we do not have access to regularly update and modify the website, the course rotations are not provided on our website. They are however, provided in Degree Works for our accepted and current students. We also regularly provide the information to our advisors who meet with many of our students.

Has the sequence been followed for the current and past two academic years?

Our current course offerings are outlined below and have remained consistent over the past 2-3 years.

Fall semester – Lab Sciences

BIO 121 General Biology (2 sections) – daytime and evening
BIO 115 Human Biology (2 sections)– Hybrid daytime and evening
BIO 211 Anatomy and Physiology (1 section) – daytime
BIO 212 Anatomy and Physiology II (1 section) – evening
BIO 235 Microbiology (1 section)– daytime course

CHE 111 Concepts of Chemistry (1 section) – daytime
CHE 121 General Chemistry 2 section) – daytime and evening
CHE 122 General Chemistry II (1 section*) – daytime or evening
*CHE 122 General Chemistry II is offered alternate years to ensure enrollment.
EVS 105 Environmental Field Lab – lab only – evening
PHY 122 General Physics (1 section) - evening
PHY 222 Calculus Based Physics (1 section) -daytime

Fall Semester – Non-Lab Sciences

BIO 111 Introduction to Nutrition (1 section) – online
BIO 123 Biology of Human Disease (1 section) – online
EVS 100 Introduction to Environmental Science (1 sections) –evening
OCE 101 Introduction to Oceanography (2 sections) – evening and daytime
SCI 103 Recent Discoveries in Science (1 section) - online

Spring Semester Lab Sciences

BIO 235 Microbiology (1 section)– daytime course
BIO 121 General Biology (2 sections) – daytime and evening course
BIO 115 Human Biology (2 sections)– Hybrid daytime and evening course
BIO 211 Anatomy and Physiology (1 section) – daytime
BIO 212 Anatomy and Physiology II (1 section) – evening
CHE 111 Concepts of Chemistry (1 section) – daytime
CHE 121 General Chemistry 2 section) – daytime and evening
CHE 122 General Chemistry II (1 section*) – daytime or evening
*CHE 122 General Chemistry II is offered alternate years to ensure enrollment.
PHY 122 General Physics (1 section) – evening (co listed with PHY222)
PHY 222 Calculus Based Physics (1 section) -daytime (co listed with PHY122)

Spring Semester Non-Lab Sciences

BIO 111 Introduction to Nutrition (1 section) – online
BIO 123 Biology of Human Disease (1 section) – online
EVS 100 Introduction to Environmental Science (2 sections) – daytime and evening
OCE 101 Introduction to Oceanography (1 section) – evening
SCI 103 Recent Discoveries in Science (1 section) - online

How does the sequence serve part-time students? Do you coordinate course offerings with other programs?

We work with other programs to determine the best times for both our lab and non-lab science courses. Because lab sciences are 6 hours of contact time per week and we only have 3 labs on campus, it can be difficult to schedule them without overlapping in our laboratory space. We generally have 4 laboratory/class times, MW am, MW afternoon, MW evening and TR am, TR afternoon and TR evening. Because Fridays offer only 1 day of instruction, we have not historically put labs on those days. We have also offered many of our non-lab sciences online as well as at least 1 lab science in an online/hybrid format to meet the needs of our online students (Human Biology). We also offer a General Biology course in an online/hybrid format in the summer. For students who need multiple sciences and are entering the science or allied health field, it is more difficult to meet their needs in any format other than the traditional classroom environment because of the laboratory skills that need to be provided for upper level sciences courses (Anatomy and Physiology, Microbiology, Chemistry).

5) Trends

a. What have been two major national and/or state trends specific to your discipline during the current and past two academic years? b. What are the emerging trends that will dominate during the next three years? (Do not include enrollment or retention issues here.)

Information Literacy - Trends in the sciences include more technological literacy and information literacy. Students should be literate in information and be able to understand when information is research based, fact based and relevant. Students today rely on social media to get their information which can be a hindrance to their scientific literacy. All of our courses work to teach students about government and academic websites and teach students how to access peer reviewed sources and how to identify peer reviewed, published scientific sources.

Real World Application – Another trend is for students to learn science and understand it by making it applicable to the real world. For example, when teaching Chemistry laboratories, allow students to simulate a real hospital test or real data from a patient to understand the value of concentrations, titrations, measurement etc. Another example would be teaching Microbiology for nurses with real world application in mind. For example, students in Microbiology are studying and research real data related to COVID so they can see how Microbiology affects a real world, real time pandemic and they are looking at the data being published around them. These approaches allow students to understand why they are learning what they are learning and how it directly applies to their chosen career.

Current Issues in Science – Another trend is that students should be taught basic scientific literacy so they can understand current issues. To be an engaged citizen, one should understand the current issues in science that may affect their lives. They may need to understand the issue of Global Warming and Environmental Issues as it relates to the future of the Earth and Voting in a local or national election. Students may need to understand current issues in Health and Medicine when it comes to access and safety of a new vaccine or newly available drug.

All of these trends continue to be important for the students who are taking the courses for a career and for those who are taking courses as a General Education elective. Students should leave their science class able to understand current issues in science, understand data and whether it is research based or opinion (and the value of research) and how to understand where to find more information to further look into questions on science or medicine. Students should leave our courses with both information literacy and scientific literacy.

c. *What transfer articulation agreements exist with other institutions?*

We provide course to serve two general programs for students looking to transfer or who have not identified a major, these are Liberal Arts and Sciences (LAS) and General Studies (GS). Sciences at QVCC provide course for the other programs we offer (business, early childhood education, management, visual arts, computer science programs, engineering science pathway to teaching, Medical assisting, Medical Technology Studies and Manufacturing). The two primary articulations specifically for science majors are the Biology TAP degree (2 +2 program from CC to 4-year state institution) and the Technology Studies Biomedical Sciences program. Outside of these two programs, QVCC students do not declare a major at the 2-year institution.

6) Institutional Barriers

a. *What are the major institutional barriers to success that students experience in your program or discipline? (Focus on teaching, learning, and curricular issues.)*

In our science courses, preparedness is often the biggest issue. Students come to campus often with insufficient writing skills, insufficient math skills and insufficient study skills. Science courses are rigorous and require mathematic application, critical thinking and good scientific writing skills. Even students who have completed Composition can come in with deficiencies in writing scientifically. For many students, many do not have experience solving analytical problems. All these skills, scientific writing, analytical thinking and study skills, must be practiced and learned to succeed in sciences.

Some of the particular issues occur at the 2 year college, that may not happen at the 4 year college, is that students who are interested in science or health, may have to begin in developmental math or introductory math courses, so they fall behind on their programming because science courses should never be stacked in one year. For many science majors, they need to take a year of mathematics, a year of Chemistry or Physics and/or a year of Biology. When/if the student spends their first academic year catching up in math and English, the students end up taking too many science courses together which can result in too challenging of a course load.

Another complication with our Community College system, is that many of our students have full time family obligations or full-time work obligations and have difficulty finding the on-campus time to take all the courses they need. Sciences are often not able to be taken online because of the laboratories, so students often need to be on campus multiple days and times to complete all laboratories necessary to finish the science core courses.

b. *What is your plan to address these issues?*

One approach to reach some of these students is to offer more sciences that students could take as developmental students. An introductory course to make up for that missing math, writing and analytical skills. We have proposed and tried these courses in the past, but due to our small size, they often don't fill and get cancelled. However, a 3 credit science courses for allied health and STEM majors to work on these skills could be very beneficial. If the college could commit to offering such a course and allowing it to run even with low enrollment, it could really benefit the students.

Increasing our tutoring support to encourage more professional staff readily available to tutor and provide support in math, science and scientific writing is another step towards meeting the needs of our science students. While we have excellent tutoring staff, sometimes we are short in tutors that can address science courses. Access for many of our students is also an issue, our full-time workers and full-time parents often have limited ability to get to the tutoring center. Continuing to support online tutoring and online appointments for students would be another excellent way to reach our students.

Another option to help students succeed is through advising. Students who come in below basic college level English and Math, should theoretically, take the extra year of college to get through the basic science track when they begin in the developmental sequences. This should be discussed with the student so they know their chance at success will be increased if they don't take more than 2 lab sciences or more than one math and science at once.

Lastly, finding ways to offer courses at various times and course styles can help students fit the courses into their schedules. In the sciences, we have done an excellent job creating hybrid options (A&Ps, Human Biology, Biology) and online option (Biology, Microbiology, A&Ps) courses so students can fit in the courses they need on campus and find time to fit in other courses online or with less time on campus. Considering the recent course revisions following the COVID pandemic, these formats should continue to be offered to reach our students and meet their needs.

7) Instructional Support

What are your current classroom, media, and IT needs? How will those needs change in the future? What support will be necessary to meet those needs?

At QVCC, we have excellent support for media, IT and classroom instructional tools. Each of our labs are equipped with projectors, instructor stations, whiteboards, and document cameras. Our IT department, as small as it is, always provides whatever we need quickly. They respond with concerns and requests regarding equipment malfunctions quickly. Our Distance Learning support is also excellent and responsive. We have support for our Blackboard through our DL coordinator and frequent trainings. Our library provides trainings without our courses as needed, orders books and media we need when requested. They offer our students specific training on specific assignments. At QVCC, these departments work closely with faculty and there are few kinks or problems.

However, as faculty, we have concerns for the future as our colleges are merging across the system. We worry that the new large departments and lack of personal contact will create backlogs in assistance and help and delay the ability to be effective teachers. As instructors who rely exclusively on OneDrive, Blackboard and other online platforms, losing a day or two because of a computer malfunction or inability to access our courses can result in lost instruction and frustration for students. As these departments merge, we really hope that the small personal touch is not lost, and we keep our support folks local to respond to our needs quickly.

8) Budget

What is your current budget and how is it spent? Are there any crucial budget needs you can forecast now that will emerge in the next three years?

Our current instructional support and budget have been adequate and has not been a large detriment to our programming. Our science budget for 2019 was approximately 17,000\$ in which the majority of that funding (16, 459\$) went to educational supplies for laboratories. Our supply budget has been good and has allowed us to order the supplies needed to cover our laboratory courses.

However, our student worker budget has decreased each year, and this is something that has been detrimental to our instructors. As I have mentioned, we only have 1 full time Biologist and 1 full time Chemist to support all the lab courses taught in these areas. Without enough student worker support, the laboratory set up and support does not occur. Due to these shortages, there have been many occasions where our adjuncts have shown up for an evening course without the supplies and materials prepared for them to teach the course.

Another crucial need is to continue to provide staffing for our Laboratory Director or hire someone to replace our laboratory director. Our laboratory director has been hired away from this position to work in Academic Affairs. This has resulted in less time for training student workers and assisting adjuncts to set up and get trained on laboratories. We have been lucky because many of our adjuncts are long time employees and know their way around the labs, this won't always be the case and we will need that support for our instructors as well as for ordering supplies, and training student workers.

9) Public Disclosure

Does discipline information published on the website provide enough information to allow students and prospective students to make informed decisions about registering for classes within the discipline?

The new “system” maintains the website for our transfer programs through the TAP programming. While the information is there, we have no information on how often or how frequently it is changed, edited, reviewed or updated.

Locally, we do have the ability to review our website and suggest changes, but with limited access or any access, these changes are often not supported or made if they don't fit the suggested “mold”. There needs to be more descriptive information about courses, programs and faculty on the website and faculty should have the ability to create, change and update information frequently. Science is ever changing and using the Website to offer that information is crucial in this information age.

10) Resource requests/suggestions

- 1) Hire Science Faculty - Currently, our program has only 2 full time faculty members. One Biologist who specializes in Genetics, Biology and Microbiology and a Chemist who specializes in General Chemistry and Environmental Sciences. We also used to have a full time Physics faculty member who specialized in Physical Sciences as well as, Geology and Astronomy courses; they were never replaced upon retirement. Our Physics instructor is our full time Engineering faculty member who also serves a program coordinator for Engineering Science, Technology Studies and Manufacturing. Our Full Time / Part Time faculty ratio for Spring of 2020 was 30 credits taught by Full time faculty and 57 credits taught by part time faculty which is only **34% of our courses taught by full time faculty**. In the fall of 2020, that number improves slightly because our Chemistry faculty member who was serving as interim dean is returning to faculty and 39 credits are taught by full time faculty and 51 credits by part time faculty for **43% of our courses taught by full time** faculty. This should be addressed immediately. We need faculty who are specialists in Anatomy and Physiology as well as faculty who can improve and teach in the Physical sciences disciplines. Both of these disciplines are important for Nursing/Allied Health and Engineering/Technology Studies, respectively and should have faculty dedicated to improving and maintaining curriculum in those areas.
- 2) Continue and Expand Online Offerings – To continue to fully support our students, many who are full time parents and/or full-time employees, we need to continue to offer hybrid, online and flexible course offerings. We have had much success with these formats, and they should continue to fully support our students and help them be successful and complete their coursework in a timely way.
- 3) Student Workers and Staff Laboratory Director – We need to continue to find funding to staff adequate student workers and train them adequately. Good student workers who are skilled in laboratory preparation are difficult to come by, having to hire them short notice often results in losing good workers. We should be able to maintain our student workers long term as well as, continue to train additional student workers as they become available. Furthermore, having a full-time staff Laboratory Director to support the sciences with budget, ordering, laboratory preparation, adjunct support and student worker training is critical, and the position should be brought back. If this does not happen, long term, faculty will teach fewer intensive laboratories and will have rely on kit based or pre-made supplies which will cause the cost of laboratories to increase quite a bit.

- 4) **Improve Access to Website** – Faculty should have access to the website to update content, provide advising links and information and generally be more user friendly for students in our courses and programs.

List resources that will be needed over the next 5 years; financial, physical, personnel

- 1) Laboratory Support - Resources needed include continued support for laboratory preparation, ordering for laboratory supplies, training of student workers, hiring and continuation of student workers in the laboratory.
- 2) Increase in Full Time Faculty - We should look at hiring another full-time faculty member in the sciences to offset our high FT/PT ratio as well as address needs in the area of Anatomy and Physiology.
- 3) Support for Online Instruction – In light of COVID, training should continue to get all instructors up to speed in online training. Faculty should become ITeach certified and ready to teach online or hybrid courses. Our Biology faculty member has been serving as a peer mentor to train faculty on Blackboard and Virtual technology (WebEx, Collaborate, Teams). This work should continue.

**Department Chair,
Sciences**

Date: _____

Chemistry

Date: _____

Biology

Date: _____

Physics

Date: _____