

## CHEMISTRY

COMPREHENSIVE PROGRAM REVIEW 2018

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## INTRODUCTION

The AS Chemistry Program has grown significantly since the program's inception in the early 1990's. Most of the students select this program as a gateway either to further education goals or for promotion in current career positions. This program offers a selection of courses in Chemistry and related sciences, and comprises of the first two years of a baccalaureate degree in Chemistry as shown in Table 1. At present, one full-time faculty person and two - three adjunct faculty members teach all of the Chemistry courses offered at Cecil.

Table 1. General Education and Program Requirements

| Course Number | Course Title | General <br> Education Code | Credits |
| :--- | :--- | :--- | :--- |
| General Education Requirements |  | H | 6 |
| ARTS/HUM | Arts and Humanities Electives | S | 4 |
| CHM 103 and <br> CHM 113 | General Chemistry I <br> General Chemistry I Lab | S | 4 |
| CHM 104 and <br> CHM 114 | General Chemistry II <br> General Chemistry II Lab | E | 3 |
| EGL 101 | Freshman Composition | H | 3 |
| EGL 102 | Composition and Literature | M | 3 |
| MAT 121 | Pre-calculus* | SS | 4 |
| SOC SCI | Social Science Electives ${ }^{\dagger}$ | H | 6 |
| SPH 121 or <br> SPH 141 | Interpersonal Communications Public Speaking | 3 |  |
| Program Requirements |  | 4 |  |
| CHM 203 | Organic Chemistry I with Lab |  | 4 |
| CHM 204 | Organic Chemistry II with Lab |  | 3 |
| CSC 109 or <br> PHE 180 | Introduction to Programming or <br> MATLAB Fundamentals | M | 4 |
| ELECT | Electives | M | 4 |
| MAT 201 | Calculus I with Analytic Geometry | SL | 5 |
| MAT 202 | Calculus II with Analytic Geometry | SL | 5 |
| PHY 217 | General Physics I with Lab |  | 4 |
| PHY 218 | General Physics II with Lab |  | 4 |

The Chemistry program is one of the programs offered in the Department of Sciences and Engineering, and provides a strong foundation in the principles and practices of modern Chemistry by emphasizing fundamental topics in Chemistry, Mathematics and Physics. The major gives students the discipline and hands-on experience testing theories in the laboratory. Additionally, our courses will acquaint non-majoring students with the basic principles and methods of modern science and development of scientific thought. Our Chemistry program prepares students for

[^0]admission into a Chemistry or related STEM field baccalaureate program, pre-medical/dental program, pharmacy school or secondary teaching.

The program goals include ensuring that the information in the core Chemistry courses and the program offers the most relevant classes to help students continue their education and/or make them workforce ready. In addition, it is important to provide each classroom/laboratory with the materials required to teach the courses as requested by the instructors. Doing so will allow instructors to use their strengths to educate students and thereby fulfill the strategic priorities one and two of driving academic achievement and fostering a dynamic learning environment, respectively. Under the umbrella of Chemistry, guest speakers have been hosted on campus and student attendance was incentivized which supports strategic plan three: to expand and deepen community alliances with the college and the students. Plans for the AS Chemistry majors include holding additional oncampus activities and discussions to encourage and create a peer-to-peer network of resources which fulfills strategic plan four: stimulate resource development to prompt student success.

By implementing these goals in conjunction with the required course work, students who successfully complete this program, will be proficient in the following outcomes:

- Apply principles and theories in the basic areas of Chemistry.
- Collect and perform qualitative/quantitative chemical analyses of data.
- Communicate scientific information through written and /or verbal formats.
- Utilize critical thinking to identify and solve problems.
- Describe and utilize the techniques applicable to Chemistry research projects.
- Use basic laboratory instrumentation for both basic and organic Chemistry processes.


## ENROLLMENT AND GRADUATION TRENDS

The total number of students enrolled in the AS Chemistry program at the beginning of the academic fall term is shown below in Table 2. Secondly, Table 3 indicates the number of students who have graduated from the program in the past five years.

Table 2. Total Student Enrollment (Majors only)

|  | Fall Term <br> 2014 | Fall Term <br> 2015 | Fall Term <br> 2016 | Fall Term <br> 2017 | Fall Term <br> 2018 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| ASCH <br> (ASCS Previously) | 16 | 20 | 23 | 20 | 17 |

Table 3. Total Number of Graduates

|  | $2013-2014$ | $2014-2015$ | $2015-2016$ | $2016-2017$ | $2017-2018$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| ASCH <br> (ASCS Previously) | 1 | 2 | 0 | 0 | 4 |

Although the number of Chemistry majors and graduates are relatively low, efforts are being made to promote the Chemistry program in hopes to increase matriculation and retention. Such as more participation in community STEM events and making students aware of current resources.

## ARTICULATION AGREEMENTS

There are currently no articulation agreements specific to our Chemistry program; however, Cecil College has articulation agreements with Maryland and regional institutions such as the University
of Delaware. Furthermore, articulation agreement with other 4-year institutions are being pursued.
PLACEMENT/TRANSFER
Students who major in Cecil College's AS Chemistry program tend to transfer to University of Delaware, University of Maryland Baltimore County/University College, and Towson University.

Table 4. Placement/Transfer

|  | $2013-2014$ | $2014-2015$ | $2015-2016$ | $2016-2017$ | $2017-2018$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| Total Graduates | 1 | 2 | 0 | 0 | 4 |
| Transferred | --- | 2 | --- | --- | 2 |
| Unknown | 1 | --- | -- | -- | 2 |

## LICENSURE EXAMS

There is no licensure exam required for this program; however, the program does try to adhere to the American Chemical Society Guidelines for Chemistry in Two-Year College Programs. ${ }^{1}$ ACS developed this set of guidelines to promote high-quality Chemistry education for students in all types of two-year college programs. The goal of these guidelines is to help faculty provide students with the best possible education in the fundamental areas of modern Chemistry while relating it to other disciplines and to society.

## MISSION AND GOALS

Cecil College's Mission Statement from the current Strategic plan states, "Cecil College is an inclusive, open-access college committed to academic excellence and service to the greater region. The College provides a supportive learning environment to a diverse body of students as they build the skills and knowledge to achieve academic success, prepare to transfer, and enter the workforce. Further, Cecil College fosters intellectual, professional, and personal development through lifelong learning opportunities, the arts, and community engagement."

The AS Chemistry program helps to further the Cecil College's Mission by ultimately offering a field relevant program of study that prepares students transfers to many four-year institutions where students my continue in the study of Chemistry or pursue a career in one of the many branches of the chemical field. Furthermore, the program supports the strategic priorities Strategic Priority One (SP1): Drive academic achievement, Strategic Priority Two (SP 2): Foster a dynamic learning environment, Strategic Priority Three (SP 3): Expand and deepen community alliances, and Strategic Priority Four (SP 4): Stimulate resource development to prompt student success through the program's goals as highlighted below.

1. Ensuring the information taught in the core Chemistry courses and the program offers the most relevant classes to help student continue their education and/or make them workforce ready (SP 1)
2. Recruiting and retaining students in this Chemistry program (SP $1 \& 2$ )
3. To develop and articulation agreement with at least one 4 -year college or university. (SP $2 \& 4$ )
4. To find internships and mentors for student to actively engage in Chemistry related projects (SP 3)
5. To annually host guest speakers on campus and broaden community alliances with the college and the students. (SP $3 \& 4$ )
6. To hold on-campus activities and discussions and create a peer-to-peer network of resources.

In effort to achieve these goals it is important that qualified and dedicated instructors are hired, and that they are provide them with the tools required to fully teach their courses. Additionally, it is important that our faculty are current on the trends and information in Chemistry, and they are encouraged to participate in field specific and educational conferences. It drives student achievement when real-world applications are explained or incorporated into the classroom or laboratory. Knowledgeable and informed instructors use their skills to prepare students for continuing their education or workforce placement.

A more active role in the recruitment efforts has already begun. Annual meetings with academic advisors to discuss the benefits of the program have been held. The advertisement document for the Chemistry program have been updated and are distributed at on-campus and community recruiting events. Other opportunities will be pursues to see how the ASCH can be invited into local schools. Likewise, we plan to have conversations with four-year institutions in hope of pursuing Chemistry specific articulation agreements.

Currently student are informed about field specific job and internship opportunities. In the future we will work more closely with the office of Career Services in hopes to help students and the college develop continuous relationships with job placement and internships for Cecil Students. The general service area of Cecil College, particularly in Cecil County, Harford County, and in the State of Delaware, has numerous industries that are related to Chemistry, such as WL Gore, Siemens, and the DuPont Experimental Station. Along those lines, we plan to tap into these same companies as sources of guest speakers or recruiters for the students.

In the fall of 2018, the first steps were made to start and Chemistry club. Where students may network with each other share resources and form study groups. This will give them an sense of community within their own area, and ideally they will continue to foster these relationships as they graduate from Cecil and become resources for future students.

## STRENGTHS AND OPPORTUNITIES

The perceived strengths of the AS Chemistry program include:

- Overall, the fulltime and adjunct faculty members are well qualified to teach the courses to which they are assigned; most of the faculty have doctoral degrees.
- Incorporation of technology into the lecture and online courses to provide diverse learning modes for students.
- Students who have declared majors in Chemistry have achieved the outcomes of the Chemistry courses they have taken
- Cecil's Chemistry program is comparable to similar programs in other Maryland community colleges insofar as Chemistry and other math and science coursework are concerned.
- In the laboratory, the increase use of technology such as computers and Vernier instruments with analytical probes allow for procedures that would otherwise call for much more expensive instruments.
- Application of a Nuclear Magnetic Resonance Spectrometer and Infrared Spectrophotometer in the program builds students lab and analytical skills, which makes them more marketable for employment.
- A number of the courses in the AS Chemistry program are also required in other areas of
study, Biology, health science, and engineering curricula, which promotes student enrollment in the core courses.
- The Chemistry laboratory was renovated during the previous review process, and provides several fume hoods, adequate work space, a separate balance area and instrument room; all of these reduce clutter, help with student comfort level in the lab, and promote a safer work environment.
- Having separate General Chemistry lecture and lab courses allows the students more latitude in devising their class schedules and attracts transfer students from nearby colleges into the courses.

To further address the needs of the students, the program has the following opportunities

- Provide recommended electives depending on student interests. Students interested in health-related fields would be recommended Biology course(s) and students interested in research and development fields would be recommended higher levels of math, computer science or Physics courses.
- Link Chemistry majors with summer internship opportunities especially after they have successfully completed the first year. Local Chemistry-oriented industries include Siemens, W.L. Gore, Aberdeen Proving Ground, and Northrop Grumman.
- Have regular meeting the Chemistry Majors to assess their educational and career goals and provide them with resources to help them achieve success.
- Have students attend and present at national Chemistry or other STEM conferences, which will give them practice communicating scientific information, and network with professionals and students in the field.


## MARKETING

A complete description of the Chemistry degree program including the required courses, transfer information, program outcomes, and the program review are provided to the faculty, students and general public through Cecil.edu.

Marketing efforts in terms of recruitment have been slow, but this will increase in the future. We have begun by submitting a more inviting program description for posting on the college's online platforms. As a part of the college wide marketing strategy, the Chemistry lab was used as a backdrop in some of the new campus wide marketing photos. The faculty has also participated in information sessions, community STEM events, and campus tours when available.

## CURRICULUM CHANGES

The last proposed curriculum change eliminated the pre-requisite of college level Algebra (MAT 93) for CHM 103 and replaced it with a co-requisite of Pre-calculus or Statistics. Chemistry is a math-based field, and ideally, the students with more advanced math skills with perform better in the course and therefore retention will be increased in the program. This change was put in place due to the increased number of students enrolled in the course but lacked the math skills to be proficient in the student outcomes. Because students did not have the fundamental knowledge, they were dropping out of the course and not completing the AS Chemistry program or their other major program for which Chemistry courses was a requirement.

Besides the above pre-requisite change, a course offering change was implemented for Organic Chemistry to adjust for the low enrollment. No other changes to the program have occurred.

## LOW ENROLLMENT COURSES

The low enrollment courses are identified as the courses that average six or less students enrolled per term. For the past five years, only Organic Chemistry II with Lab (CHM 204) with an average of $5.1 \pm 2.5$ students has shown the lowest enrollment levels. Before 2015, both installments of organic Chemistry (CHM 203 and CHM 204) were offered every semester. The lack of students registering for the fall term CHM 204 classes gave rise to the low enrollment. After 2015, the offerings were modified so that only Organic Chemistry I was offered only in the Fall Semester and Organic Chemistry II was offered only in the spring. This has ensured that students will been enrolled in both CHM 203 and 204 when they are offered, and in fact since 2016 both CHM 203 and CHM 204 have shown increased enrollment.

Although the enrollment for the Organic Chemistry II class is low, this course is crucial to the overall understanding and application of Chemistry concepts for the Chemistry, Biology and Chemical engineering majors. Additionally, this class tends to attract transfer students from colleges and universities in the surrounding area. Organic Chemistry is important because it is the study of life and all of the chemical reactions related to life. Several careers apply an understanding of organic Chemistry, such as medical doctors, veterinarians, dentists, pharmacologists, chemical engineers, and of course chemists. By offering this course for majors and non-majors, Cecil colleges is supporting its mission by nurturing intellectual and professional development and preparing students for success in their future careers. Organic Chemistry is also an essential sophomore level Chemistry course of a baccalaureate degree. Without this course sequence, students would not be able to transfer as Chemistry majors into their junior year at a four-year institution.

For now, it is worthwhile to continue with CHM 203 and CHM 204 being offered in the fall and spring, respectively, and collect data to determine if any other curriculum changes are required.

## DFW RATES IN KEY/CORE/HIGH ENROLLMENT COURSES

All Chemistry majors are required to take General Chemistry I lecture (CHM 103) and the corresponding lab (CHM 113). Additionally, these classes are also required for many non-major student such as Biology, Chemical Engineering, and students pursuing degrees or employment in medical, dental, or pharmaceutical fields. CHM 103 and CHM 113 are therefore the highest enrolled classes within the program with greater than or equaling 12 students enrolled each year on average. The average yearly DFW rates are shown in Table 5.

## Table 4. Annual DFW rates for the highest enrolled courses ( $\geq \mathbf{1 2}$ students)

| Course | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 |
| :--- | :---: | :---: | :---: | :---: | :---: |
| General Chemistry I <br> (CHM 103) | $24.2 \%$ | $27.8 \%$ | $44.1 \%$ | $26.8 \%$ | $36.1 \%$ |
| General Chemistry I Lab <br> (CHM 113) | $19.8 \%$ | $24.8 \%$ | $36.8 \%$ | $26.5 \%$ | $31.5 \%$ |

The higher DFW rates usually occur in the first core Chemistry course (CHM 103/113). This may be attributed to students not having adequate math background to be successful in the course because the approved math pre-requisites were too low to promote student success. In efforts to
help students' retention in the course, and therefore the program, the math pre-requisite of Intermediate Algebra (MAT 093) was eliminated and replaced with a co-requisite of either Precalculus (MAT 121) or Introduction to Statistics (MAT 127) beginning Fall 2018. Ideally, students with higher level of math will perform better in the course, and retention in the program will improve.

In the future, an electronic in class quiz activity will be piloted in one of the courses to help with student engagement and understanding. Free peer tutoring is also provided to all students enrolled in chemistry courses, and students are encouraged to attend sessions. The full-time faculty holds regular in-person and virtual office hours to assistant students with their understanding. At a minimum, adjuncts are available before and after each course however many are available beyond their scheduled hours.

## ASSESSMENT OF STUDENT LEARNING

In past years, assessment was based upon the learning outcomes of each course. Because, there is a natural cumulative progression to the chemistry courses in this program it is beneficial to use the CHM 204 course along with presentations at semi-annual STEM fairs to measure student success in the ASCH program. The new assessment process will begin beginning 2018-2019. The following student learner outcomes were developed using ACS resources for community colleges and other two- and four-year institutions Chemistry programs offer.

AS Chemistry Program outcomes:

1. Apply principles and theories in the basic areas of Chemistry.
2. Collect and perform qualitative/quantitative chemical analyses of data.
3. Communicate scientific information through written and /or verbal formats.
4. Utilize critical thinking to identify and solve problems.
5. Describe and utilize the techniques applicable to Chemistry research projects.
6. Use basic laboratory instrumentation for both basic and organic Chemistry processes.

Through these outcomes, the program meets the college's general education core requirements.
A. Critical and creative thinking skills and problem-solving strategies
B. Writing
C. Oral communications
D. Quantitative analysis
E. Computer literacy and in the ability to work productively with information technology
F. Awareness of ethics, cultural diversity, artistic expression, health and wellness issues, and the Physical and social environment
G. Information literacy including finding, evaluating and using information effectively

The correlation between the AS Chemistry Program outcomes and the General Education Objectives are provided in the Appendix A.

Within the courses that comprise the ASCH program, a combination of assessment tools are employed. Student participation in in-class discussions demonstrate their immediate understanding of specific concepts. Most assessments take the form of assignments, quizzes, and exams. The measures give student both instructor-led and independent practice. Lecture topics are also reinforced in the laboratory where students are observed for technique and skill. Additionally,
student must demonstrate proficiency through pre- and post-laboratory assignments containing quantitative and written activities.

As the department moves toward a more comprehensive program assessment, other assessment measures will be utilized such as a oral presentation rubric. It may be also be beneficial to employ and ACS national exit exam. This tool could be used to assess students in Cecil's ASCH program, but also provide a comparison of our students' performance in the program with other students on a national level.

## NON-MAJORS

Non-majors that take the core courses are assessed the same as the majors. Typically, non-majors have educational or career goals that require them to be proficient in Chemistry at a level that is appropriate their chosen area of interest.

## STUDENT FEEDBACK

Student feedback has been collected randomly in the form of verbal and written surveys. See Appendix B. Based on the feedback, more opportunity for in class problem solving time has been incorporated into lecture classes, and self-design procedures has been eliminated from General Chemistry lab classes courses.

## TEACHING ASSIGNMENTS

Full-time Faculty:

- William Charleton, M.S. General Studies, Syracuse University (until fall 2015)
- Courses taught: CHM 103, CHM 104, CHM 113, CHM 114
- Other college activities: Academic Affairs Committee
- Ebony D. Roper, Ph. D. Analytical Chemistry, Howard University (beginning spring 2015)
- Courses taught: CHM 103, CHM 104, CHM 113, CHM 114, CHM 109 (Chemistry and Art, non-major course), ENV 106 (Intro. to Environmental Science, non-major course) ENV 116 (Intro. to Environmental Science Lab, non-major course)
- Other college activities: Academic Senate member since fall 2015, Academic Senate President since fall 2017 Chair MSCHE Standard V Committee

Full time faculty have priority on selecting which classes including dates and times they want to teach. Any uncovered classes are assigned to adjuncts according to their skills, knowledge and abilities.

## ADJUNCT FACULTY

Between 2013 and 2018 the following instructors have taught in the AS Chemistry program.

- Anna Smith, Ph. D. - Courses taught: CHM 103, CHM 113
- Donald Kern, Ed. D. - Courses taught: CHM 103, CHM 113
- Ebony D. Roper, Ph.D. - Courses taught: CHM 103, CHM 113, CHM 104, CHM 114
- Eric Lehnert, Ph. D. - Courses taught: CHM 204
- Jennifer Chapin-Lake, Ph. D. - Courses taught: CHM 104, CHM 114
- Jerry Moraczewski, M. S. - Courses taught: CHM 103, CHM 113, CHM 104, CHM 114
- Patrick Carney, M.S. - Courses taught: CHM 103 and CHM 113
- Ross Lee, Ph. D. - Courses taught: CHM 204
- Vaughn Ellerton, Ph. D. - Courses taught: CHM 103, CHM 113, CHM 203, CHM 204

The adjunct faculty are supported in the classes with adequate workspace, supplies and equipment. Their input is sought in choosing materials such as laboratory equipment and textbooks. There are at least annual in-person conferences with the adjuncts, fulltime faculty and department chairperson to determine their needs, share information and address concerns. Other council with adjuncts are as needed

## RESOURCES

Overall, the available equipment and technology is adequate for conducting the lecture and laboratory sessions. Every classroom is equipped with and instructor computer, projector and screen, whiteboard space, and large periodic table posters. An instructor may request that specific software be loaded onto any campus computer or that additional technology be added to any room this would improve student engagement or ease of teaching. This has been done in the form of chemical drawing software being added across campus, and laptop computers or devices for the faculty that can be used in addition to whiteboard.

The laboratory was renovated within the past 6 years, and has adequate workspace and storage. The new renovations allow for the labs to comfortably accommodate eighteens students, with a maximum of 20 students safely. However, we currently do not have enough supplies to support independent work. Students work in pairs or triplets, and on extreme occasions groups of four.

New equipment, specifically a Nuclear Magnetic Resonance (NMR) spectrometer and rotary evaporator, has been added to enhance student knowledge and skills. There is a classroom set of laptop computers that are programmed with applications that make it possible to use Vernier ${ }^{\circledR}$ instruments/probes as well as the current infrared spectrophotometer (IR). The next major improvement needed in in the lab will be to replace the IR with a newer model that would be similar to those found in research and science labs.

## RECOMMENDATIONS

Based on the program goals, opportunities, and resources within this comprehensive program review the following recommendations are submitted for consideration.

- A summer internship program be established with one or more local Chemistry-related industries for interested and qualified students who are majoring in the AS Chemistry Program and involve the office of Career Services.
- The current IR Spectrophotometer be replaced in the next $1-2$ years.
- The faculty should continue and increase recruitment efforts to bring in more students to the program.
- A Chemistry or related science specific articulation agreement be established with a 4-year college/university.
- More networking and social activities be planned that involve the majors in more professional development opportunities.


## REFERENCE

1. American Chemical Society (2015). Guidelines for Chemistry Programs at Two Year and Community Colleges. Retrieved from
https://www.acs.org/content/acs/en/education/policies/twoyearcollege.html (accessed March 18, 2018)

Appendix A. Program Assessment and General Education Requirements Correlations

| Program Outcomes (Gen. Education Outcomes) | Direct/Indirect Assessment Measure | Results/Success Rates ${ }^{\ddagger}$ | Reason/ Hypothesis | Action ${ }^{\ddagger}$ |
| :---: | :---: | :---: | :---: | :---: |
| 1. Apply principles and theories in the basic areas of Chemistry. <br> (A) | Students show knowledge on the basic principles and theories in Chemistry through homework, exams quizzes and other graded activities. |  |  |  |
| 2. Collect and perform qualitative/quantitative chemical analyses of data. <br> (A, D) | Chemistry is largely a math-based course. In the lecture part of the course student, use QA to solve complex chemical problems in homework, quizzes and exams. In the laboratory students learn to collect data, analyze the data, and check for precision, accuracy, and yield. |  |  |  |
| 3. Communicate scientific information through written and /or verbal formats. <br> (B, C, E, G) | Students must demonstrate they are proficient in writing through weekly lab reports where they provide theory and discussion of their results. Additionally, some classes incorporate short essay questions where students must address some Chemistry theory. |  |  |  |
| 4. Utilize critical thinking to identify and solve problems. <br> (A, D) | Chemistry is largely a math-based course. In the lecture part of the course student, use QA to solve complex chemical problems in homework, quizzes and exams. In the laboratory students learn to collect data, analyze the data, and check for precision, accuracy, and yield. |  |  |  |
| 5. Describe and utilize the techniques | Information technology is applied in some courses that use web-based |  |  |  |

[^1]| applicable to Chemistry research projects. $(\mathrm{A}, \mathrm{~B}, \mathrm{C}, \mathrm{D}, \mathrm{E})$ | assignments. Additionally, when analyzing data and performing quantitative analysis, and in using the instrumentation in the laboratories for collecting and analyzing data. Students use the Vernier measuring system in the lab and become more proficient using Microsoft word and excel. |  |
| :---: | :---: | :---: |
| 6. Use basic laboratory instrumentation for both basic and organic Chemistry processes. $(\mathrm{C}, \mathrm{G})$ | Students proficiently demonstrate accurate and precise use of laboratory equipment. Usage of instrumentation is monitored in every lab class and the student describe in their post laboratory assignments as well as on a practical exam that is given in each course. |  |

## Appendix B. Student Feedback

## Mid-Semester Feedback Form

The objective of mid-semester feedback is to offer constructive information to your instructor BEFORE the end of the semester. Your feedback will help me to conduct class in a way that is most useful to you. Only the instructor will see this feedback.

1. The pace of the lectures is...?

Comments:
Too slow

Agree
Disagree


Comments:
3. The instructor stimulates student interest in the course. Comments:
4. I am satisfied with the quality of the class discussion.

Comments:
5. I am satisfied with the integration of the lectures with the readings and assignments.
Comments:
6. The instructor explains difficult concepts effectively. Comments:
7. The instructor responds well to questions and comments. Comments:
8. The instructor is enthusiastic.

Comments:
9. The instructor shows an interest in students.

Comments:
10. The instructor provides enough practical examples. Comments:
11. The material I am learning will be useful to me. Comments:
e
12. The instructor provides sufficient feedback. Comments:
13. This is a demanding course.

Comments:
14. On a scale of 1-7, with 1 being low and 7 being high, how is the course going for you?
$\begin{array}{lllllll}1 & 2 & 3 & 4 & 5 & 6 & 7\end{array}$

What other responsible feedback can you offer to your instructor, which might help improve the course? Keep in mind that to be helpful, your comments must be a) specific, b) sensitive to the needs of the instructor and course, and c) focused on aspects of the course that can be changed.
15. What could I as the instructor keep doing, quit doing, and start doing to help you learn?
16. What can you as a student keep doing, quit doing, and start doing to promote your learning?


[^0]:    *Students placed in MAT 201 or higher Math may replace MAT 121 with MAT, PHY, PHE, CSC or CHM elective(s); students must satisfy the four-credit requirement.
    ${ }^{\dagger}$ Courses must be from two different disciplines.

[^1]:    ${ }^{\ddagger}$ The Results/Success rates, Reason/Hypothesis, and Actions section will be updated for the next review when program assessment data have been collected.

