**Sinclair Community College**

**Continuous Improvement Annual Update 2016-17**

**Please submit to your Division Assessment Coordinator / Learning Liaison for feedback no later than March 1, 2017**

**After receiving feedback from your Division Assessment Coordinator, please revise accordingly and make the final submission to your dean and the Provost’s Office no later than May 1, 2017**

**Department:** **SME - 0322 - Biology**

Year of Last Program Review: FY 2012-2013

Year of Next Program Review: FY 2018-2019

**Section I: Progress Since the Most Recent Review**

Below are the goals from Section IV part E of your last Program Review Self-Study. Describe progress or changes made toward meeting each goal over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **GOALS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| As our administration continues to define the goals for Sinclair at the YMCA and Warren County sites, the Biology department is committed to providing course offerings that support these efforts. The ability to offer hybrid classes at these YMCA/Warren county sites has saved the college $60,000 per location. | In progress [ ] Completed [x] No longer applicable [ ]  | Completed, the department offers numerous hybrid classes to meet the needs of the students at these various locationsSince the last program review, the department has been able to offer more classes at Courseview due to their expansion. In fact, we now offer the entire Biotechnology Program (BTN.S.AAS) at CVCC. Additionally, we offered Principle of Biology I and II (Gen. Bio for majors) for the first time Fall 2016 and Spring 2017 at CVCC. Our department is currently working with Evan Kloth to develop a plan to offer Principles of Anatomy & Physiology I Lab (BIO 1147) at Miami Valley CTC. Currently, Principles of Anatomy & Physiology I lecture (BIO 1141) is being offered at Huber Heights and Englewood Learning Centers but students must come to the Dayton Campus to attend a lab section for this course. If MVCTC has the appropriate facilities and support staff, then the Huber and Englewood students could take lab at this location rather than in Dayton. This would then provide more available lab seats for students taking BIO 1141 and 1147 at the Dayton campus.  |
| At this time, our primary goal is to meet the established enrollment demand for Top 45 biology courses (and the semester versions), namely BIO 107 (1107)Human Biology, BIO 141-143 (1141/1242)Human Anatomy and Physiology I- III, BIO 111-113 (1111/1211) General Biology I-III (for non-majors). No new courses are planned at this time, as some were removed from the “books” in semester conversion. | In progress [ ] Completed [x] No longer applicable [ ]  | The limiting factor for all of our courses that include a lab component is the available number of seats in these labs. At the time of the last program review, the enrollment demands were met for these classes by establishing a more structured scheduling that allowed for better use of the existing lab space. In addition, Saturday sections for the BIO 1141 and 1242 were added to the schedule to accommodate the increase demand for this course. In order to circumvent the issue with the limited lab space, online versions of BIO 1107, BIO 1111 and 1211 were developed to meet the established enrollment demands for these courses. As the enrollment increased in the online sections, we saw a decline in enrollment in the face to face sections of these courses. As a result, we no longer experience issues with limited lab space for the face to face sections of these courses.  |

Below are the Recommendations for Action made by the review team. Describe the progress or changes made toward meeting each recommendation over the last year. Responses from the previous year’s Annual Update are included, if there have been no changes to report then no changes to the response are necessary.

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| **RECOMMENDATIONS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| While the department did an outstanding job of articulating which activities in programs and courses address each of the General Education outcomes, no data was provided regarding how well students are performing on these measures. The department has already laid the groundwork for increased assessment by identifying activities, it is recommended that the department take the next step in assessment and begin collecting, aggregating, and analyzing data from these activities so that the department can demonstrate students are achieving these outcomes. | In progress [x] Completed [ ] No longer applicable [ ]  | The department is in the process of identifying the courses and the assessment measures that will provide the best data for determining how well our students are achieving the General Education outcomes. The next step in completing this recommendation is to determine the best methods of collecting the data from these courses. **Assessment Results for Cultural Diversity and Global Citizenship in BIO 2225 to accommodate the BIOE.S.AS program (2015-2016):**Bio 2225 Ecology has a history of informing and requiring students to participate in an Ecoliteracy project that includes posters, papers, and presentations. **Ecoliteracy has four components that are used to evaluate students for each of their communication formats. The first is a**n understanding of how the earth works, including basic ecological concepts (i.e. ecosystems, energetics, population and community ecology, carrying capacity, and material cycles). The second is how humans fit into the ecology of the planet, including familiarity with the human threats to ecological integrity (i.e. global warming, ozone depletion, habitat destruction). The third is the possible solutions to these human threats to the earth’s ecological systems. The foundation upon which these first three components of ecological literacy are built is the fourth component. Finally, a feeling of kinship, or connection, with the natural world.In an effort to have students embody cultural diversity and global citizenship in their Ecoliteracy posters, the class was divided into two groups. One group concentrated on poster preparation for the Dayton SMART Bilingual School, K-4th grades, and the other group’s preparations were for the Sinclair Community. Both the Dayton SMART Bilingual School and the Sinclair Community reflect diverse cultural communities. The Sinclair community also has a growing population of members of the Global Community beyond Dayton. In addition, the Service Learning component came into play since the posters were used to educate both diverse populations. For BIO 2225, 94% of students demonstrated mastery of this outcome by earning a “C” or higher on their ecoliteracy posters.**Assessment for Cultural Diversity and Global Citizenship in BTN 1110 to accommodate the BTN.S.AAS program (2015-2016):**Bioethics is an applied field of ethics focusing on medical and biological research. In this course we focus on issues that will confront the graduates in their future professions. Students will learn the applicable background science and then be confronted with various bioethical dilemmas. After studying the case and researching the arguments of the different stakeholders, they must form a stance on the issue as well as suggest possible resolutions/courses of action in a graded online discussion forum. Students are assessed by the strength of their supporting evidence as well as responding critically but respectfully to two or more classmates. The discussion is continued the next class day for the first part of class where summaries are read followed by a general class discussion. Past topics have included: security of a patient’s genetic information, risks of bioterrorism, genetically modified foods, ethical limits to controlling the spread of a disease, animal research, forensic use of DNA, efficacy vs. cost of bioremediation, the safety of aquaculture/genetically modified animals, xenotransplantation, patient access to clinical trials, cost of medicine & biopharmaceuticals and more! **Assessment Results for Information Literacy in BIO 2235 Genetics to accommodate the BIOE.S.AS program (2016-2017):**The provided information literacy rubric was used to assess student research papers Spring 2016. The results of the assessment are as follows:1. Pose valid research or discovery question
* 89.3% of students scored “competent” or higher

2.       Organize and integrate information and use information ethically* 78.6% of students scored “competent” or higher

3.       Select sources to support an idea that are appropriate, credible and relevant * 46.4% of students scored “competent” or higher

**Assessment for Information Literacy in BTN 1110 to accommodate the BTN.S.AAS program (2016-2017):**Faculty assessed information literacy based on graded discussion forums. The results are as follows: nine students out of sixteen scored 70% of better on required discussion forums in the course.**Assessment for Oral Communication in the BIOE.S.AS program:**This outcome is being assessed in COM 2211 or COM 2206 or COM 2225.**Assessment for Oral Communication Biotechnology courses to accommodate the BTN.S.AAS program:**Assessment in communication is roughly 45% for the overall grade. Approximately 80% of those who complete the oral assignments receive a “C” or better. Additionally, this general education outcome is being assessed in COM 2211.**Assessment for Written Communication in BIO 1171 to accommodate the BIOE.S.AS program:**Approximately 95% of students score 70% or better on written lab reports. Additionally, this general education outcome is being assessed in ENG 1101.**Assessment for Written Communication in Biotechnology courses to accommodate the BTN.S.AAS program:**Assessment in communication is roughly 45% for the overall grade. Approximately 80% of those who complete the written assignments receive a “C” or better. Additionally, this general education outcome is being assessed in ENG 1101.**Assessment for Computer Literacy in BIO 1272 to accommodate the BIOE.S.AS program:**In BIO 1272 students are assessed on computer literacy by their ability to complete an online genetics experiment simulation. The assessment of this outcome showed 70% of the biology students successfully completed the population genetics experiment as demonstrated by their ability to successfully answer population genetics questions on an exam.This outcome will be assessed again next using in BIO 2235 Genetics**Assessment for Computer Literacy in biotechnology courses to accommodate the BTN.S.AAS program:**This outcome will be assessed next year in BTN 2210 Protein Purification. **Assessment for Critical Thinking BIO 1171 and BIO 1272 to accommodate the BIOE.S.AS program:**Multiple laboratory practicals and lecture exams involving critical thinking questions were used to assess this general education outcome. On average, 59% and 52% of students earn a C or higher on the lab exams in BIO 1171 and BIO 1272 respectively. Additionally, 61% and 67% of students earn a C or higher on the lecture exams, respectively.**Assessment for Critical Thinking in Biotechnology courses to accommodate the BTN.S.AAS program:**Multiple laboratory practicals and lecture exams involving critical thinking questions were used to assess this general education outcome. On average, 78% of biotechnology students earn a C or higher on the lab practicals in all biotechnology lab courses.On average, 64% of biotechnology students earn a C or higher on the comprehensive exams in biotechnology courses. |
| The current program outcomes for BIOE.S.AS were developed at a time when the degree was an emphasis area in Liberal Arts and Sciences. Now that the program has come into its own as an independent degree, additional outcomes should be developed that target BIO specifically. The existing outcomes can be kept, but they should be enhanced with additional targeted outcomes for BIO, and activities should be identified that are associated with these new outcomes similar to the specific activities have been identified that are associated with the current outcomes. Developing a small number of additional outcomes will be crucial to helping the BIOE.S.AS program develop its own identity as an independent program, rather than just as one option among many for Liberal Arts and Sciences program students. The department is encouraged to seek support from the division learning liaison in developing program outcomes and a system for collecting, analyzing and using outcomes data to improve the program. | In progress [ ] Completed [x] No longer applicable [ ]  | The program outcomes for BIOE.S.AS have been updated and assessment of these outcomes have been added to the annual report.  |
| Efforts were initially begun to articulate credit from the non-credit Biotechnology offerings that the department has developed with Workforce Development. The review team recommends that these efforts be pursued to completion to give students participating in non-credit education a head start on earning a credit-bearing credential. Having this may enable the department to recruit more students into the Biotechnology program. | In progress [ ] Completed [x] No longer applicable [ ]  | The department investigated the possibility of articulated credit with courses offered by Workforce Development, PLTW, and Tech Prep. The results of the investigation are as follows:* WFD offers a short-term certificate in Bio-manufacturing which is a subdivision of Biotechnology. Although the coursework and learning outcomes are similar, to some extent, to the courses in our BTN program, there is not enough similarity to justify giving credit for one or more of the BTN courses after completing the short-term certificate. The information students learn in short-term certificate is very broad and does not encompass the learning outcomes for any of our BTN courses.
* We are currently discussing the possibility of developing a short term certificate that may bridge the gap between the WFD short term certificate and articulation with course(s) in our BTN program. We need to investigate the skill sets sought by our local biotechnology industry partners prior to developing this certificate to ensure that we are offering a viable certificate.
* Faculty in our department have reviewed the curriculum outcomes for the Biomedical Pathway in PLTW. This pathway does not correlate with the program outcomes and coursework for the BTN.S.AAS degree. However, there is a possibility of students enrolled in PLTW Biomedical to receive credit for one of our introductory courses, BTN 1110 Biotechnology and Bioethics.
* Biotechnology Tech Prep students currently receive credit for two of the courses in the BTN.S.AAS degree: BTN 1110 and BTN 1120. Also, Tech Prep students will now receive a letter grade for these courses instead of a “Y” or “N” on their transcripts upon completion of these courses at the high schools. The will afford the students the opportunity to receive credit for these courses at other institutions of higher education.
* During Fall 2015 we developed and are currently awaiting approval to offer a 30 hour Bioscience Lab Skills Certificate. This certificate will provide students an opportunity to learn basic lab skills and apply these courses toward the Biotechnology A.A.S. degree. Although Workforce Development is not currently offering the short-term certificate in biomanufacturing, we could investigate the possibility of using the Bioscience Lab Skill CRT as a bridge between the STC offered by WFD and the 2 year degree in Biotechnology.
* We have completed this recommendation until WFD identifies the need to offer the short-term certificate in biomanufacturing in the future.
* Update for 16-17 AY: Bioscience Lab Skill Certificate was approved and offered for the first time Fall 2016.
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| The department is encouraged to bolster its collection and use of data, particularly in regards to transfer and employment of graduates. Research, Analytics, and Reporting (RAR) has access to National Student Clearinghouse data that can provide comprehensive data on where students transfer to and what degrees they receive at their transfer institutions. In addition, RAR has access to Ohio Department of Job and Family Services data that can provide data on employment of graduates, which may be particularly beneficial for the Biotechnology students. Finally, RAR may be able to help find ways to document the benefits of the excellent work that is done helping students in the B.I.O.S.I.S. lab. | In progress [x] Completed [ ] No longer applicable [ ]  | We are currently working with RAR to revise the questions included in the online Recent Graduate Survey. We will continue to provide feedback to RAR regarding these surveys. Faculty involved in the BTN program developed a Facebook page utilized by current and past BTN students. Faculty are currently collecting data from recent BTN graduates using the Facebook page and via phone calls. They are also collecting employment data from the Ohio Department of Job and Family Services. Although faculty are currently collecting this data, our department will investigate using RAR to help with this task.The following data was collected using SAS Visual Analytics:* As of AY 2015-2016, 7.8% of the BIOE.S.AS graduates are enrolled at a four year university
* As of AY 2015-2016, 3.6% of the BTN.S.AAS graduates are enrolled at a four year university
* The top five colleges our graduates in both programs are subsequently enrolled are: Wright State University, Clark State Community College, The Ohio State University, University of Cincinnati, and Columbus State CC.
* Fifty percent of our graduates enrolled in a four year university attend Wright State University.
* According to data from Ohio Department of Job and Family Services, over the past four years (2012-2016) 88% of our BTN.S.AAS graduates are employed.

In 2012, the Biology Department developed and distributed a survey to 300 students total enrolled in the Principles of Anatomy and Physiology I, II, and III courses to determine the effectiveness of BIOSIS (biology self-Instruction and tutorial services lab). Historically, the majority of students visiting BIOSIS are A&P students. Students were asked to rank the effectiveness of BIOSIS on a scale from 1 to 5 (1 = not helpful; 5 = extremely helpful). According to the survey, 60-65% (n=205) of students rated BIOSIS as very helpful (chose rank of 4 or 5). Students were also asked to indicate their current lab grade at the time of the survey. The following data indicate the percent success rate (students with a lab grade of A, B, or C) for each A&P course: 64% (n=44) success rate in BIO 147 (A&P I lab); 85% (n=147) success rate in BIO 148 (A&P II lab); 80% (n=95) success rate in BIO 149 (A&P III lab).Our department is currently working with RAR to determine the best methods to collect more current data demonstrating the effectiveness of our BIOISIS lab.  |
| Are there opportunities to move some of the resources provided in the B.I.O.S.I.S. lab into an online format so that students located some distance from campus who are taking online sections could benefit from these resources?  | In progress [ ] Completed [x] No longer applicable [ ]  | Students utilizing BIOSIS on campus have access to the same/similar lab material they encounter in their lab courses. These materials include anatomical models, microscopes and slides, organs/organisms for dissection etc. The online courses were developed to include photos, illustrations and/or interactive animations of these same lab materials to give the online students a comparable learning experience as their face to face counterparts. Online students have continual access to all of these online labs materials as long as they are registered for the course(s). In addition, information about BIOSIS at the Dayton campus is included in the eSyllabus for all online courses to give online students, living close to campus, the opportunity to see the lab materials face to face. Furthermore, faculty teaching the face to face version of these courses have access to the interactive lab materials developed for the online courses and include in these online materials in their course eLearn shells. These materials provide additional study material for students unable to visit BIOSIS during the normal hours of operation. |
| The department has experienced increased enrollment in recent years, and with the push nationally and regionally for more education in STEM areas, and with the possibility that more companies requiring STEM-educated employees will be moving into the area, it is important that the department monitor potential employment demand and the impact that might have on enrollment. If enrollment increases look likely, the department may need to be thoughtful and strategic in determining how those increased demands may be met, particularly in light of constraints of space and equipment. Some course offerings may need to be prioritized over others in the future, resources within the department may need to be shifted around, and options for increasing lab capacities may need to be considered, along with any other strategies that might be implemented to increase student capacity. | In progress [x] Completed [ ] No longer applicable [ ]  | The department continues to monitor the employment demands within the biotechnology industry by maintaining productive relationships with our Advisory Board members and reviewing employment data provided by BioOhio. BioOhio is a non-profit organization working to build the bioscience industry and education in Ohio. This organization is the liaison between the industry members and academia. According to data collected by BioOhio, Ohio currently has over 2,000 bioscience-related organizations, at over 3,000 facilities in 81 of 88 Ohio counties. In 2014, bioscience firms employed over 68,000 Ohioans, earning an average wage of $72,260. The Southwest region of Ohio, including Warren County, is one of the fastest growing regions for bioscience industry. In order to meet the demands of this growing industry we started offering the BTN.S.AAS program at the Courseview Campus. A full-time tenure track biology faculty was hired for CVCC to serve as the Biotechnology Program Director at this campus. The role of the director is to oversee the program, advise students and communicate with the biotechnology faculty at the Dayton campus to ensure consistency between the campuses. Bioscience Lab Skill Certificate was developed and offered for the first time Fall 2016. This certificate gives biotechnology students the opportunity to learn basic bioscience lab skills in preparation for internships at biotechnology industries. This certificate is also stackable with our BTN.S.AAS degree program. As of Spring 2017, we are investigating the possibility of offering all biotechnology courses in the evening at Courseview to attract students who have conflicts with courses during the daytime hours. This is strongly being considered due to feedback from informal student surveys.We continue to see demand for the BIO 1171 and 1272 Principles of Biology I and II courses. These are required courses for the BIOE.S.AS degree. These courses are only offered once per year due to limitation in lab space. We have had waitlists for these two courses over the last academic year indicating the demand for the courses. We have submitted a request for at least two additional lab rooms to meet the demands for these courses. We are hoping that we will get at least two additional lab rooms on the third floor of building 3 due to the backfill of rooms when the health sciences labs move to their new building.  |
| Section IV.E of the self-study report addresses goals for the program, and the only goals listed were providing support for institutional goals and meeting increased enrollment demand. The department should give some thought to what other goals might be appropriate – where does the department see itself in five years? Ten years? What goals and related infrastructure will need to be put in place to get there? | In progress [ ] Completed [x] No longer applicable [ ]  | The department is currently developing additional short-term and long-term goals. However, one short-term goal is to develop a strategy for effectively offering college credit plus courses at local high schools. Our department must maintain open communication with the department of School and Community Partnerships at SCC and the high school teachers to ensure quality instruction of these courses.AY 2016-2017: We continue to expand our CCP offerings within local high schools. This year we have adjunct and full-time faculty teaching biology courses at Butler Tech Bioscience and Jefferson Twp. High Schools for the first time. We are also exploring the possibility of expanding our CCP offerings by working with existing PLTW programs. In addition to CCP, we continue to strengthen our relationships with existing Biotechnology Tech Prep programs as well as establishing new Tech Prep programs at other area high schools.High school teachers and students in the Biotech Tech program are invited to SCC to participate in interactive labs and demonstrations facilitated by our Bio/BTN faculty. These visits, coordinated by the Tech Prep Office at SCC, are a productive and effective way to promote our Biology and Biotechnology programs. Furthermore, the SCC faculty perform site visits throughout the year to observe the materials, labs, and student success in this program. These visits ensure consistency of the curriculum taught at the high school with curriculum of the course taught at SCC.Other additional departmental goals include:* Replacing 7 tenured faculty that will most likely retire within the next 10 years. We will need to replace these faculty with tenure-track positions to maintain operations of the department and provide quality education to our biology and biotechnology students.
* Update existing general biology and anatomy and physiology lab rooms.
* Acquire additional lab space to accommodate the increased demand for the following courses:
	+ General Biology I (BIO 1111)
	+ Principles of Biology I and II (BIO 1171 and 1272)
	+ Principles of Anatomy and Physiology I (BIO 1141)
	+ Ecology (BIO 2225)
	+ Genetics (BIO 2222)
* We are requesting at least two additional lab rooms on the third floor of building 3 due to the backfill of rooms when the health sciences labs move to their new building.
* Update equipment used in our biotechnology labs. As scientific knowledge and technology advances at a rapid pace we will need to update our curriculum and possibly purchase equipment to provide our students with the most current training relevant to the biotechnology industry. In addition, biotechnology faculty may need to seek additional training on these novel techniques.
* Explore additional transfer agreements with other four year universities for both biology and biotechnology associates degree graduates.
* Increase our marketing strategies for both the Biology and Biotechnology degree programs by using social media, short video clips and facebook.
* Investigate and possibly implement other methods of content delivery (ie. flipped classroom model) and methods of assessment in our courses with low student success rates.
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| The department should monitor employment opportunities in Biotechnology carefully to determine whether we are offering the appropriate degree level to meet employment needs – if fewer jobs become available at the associate degree level and more jobs require higher levels of education, it may be appropriate to consider making the Biotechnology degree a transfer degree rather than a career program. | In progress [x] Completed [ ] No longer applicable [ ]  | As stated earlier in this update, the department continues to monitor the employment demands within the biotechnology industry by maintaining productive relationships with our Advisory Board members and reviewing employment data provided by BioOhio. We meet with our Advisory Board twice a year and have recently included new members from bioscience industries in the Southwest region of Ohio. We also collect information in regards to employment opportunities by maintaining communication with graduates of the BTN program. This is accomplished by phone calls, emails, and entries in the BTN Facebook page. Graduates working in the biotech industry will often post job openings from their place of employment on the BTN Facebook page. Current students network with recent graduates also using Facebook. We are also working with Chad Bridgman, Internship Coordinator at SCC, to offer more internship opportunities to our BTN students. As of Spring Semester 2016, we have been approved to offer BTN 2700 Internships as an elective in our BTN program. This course will allow the Bio Dept. and Chad Bridgman to collect data about internship opportunities for our students.We are currently investigating the feasibility of offering a baccalaureate degree in Biotechnology to potentially increase employment opportunities for our BTN graduates. A preliminary sketch of a baccalaureate degree was developed, however, the status of the degree program has been placed on hold. Bioscience Lab Skill Certificate was developed and offered for the first time Fall 2016. This certificate gives biotechnology students the opportunity to learn basic bioscience lab skills in preparation for internships at biotechnology industries. This certificate is also stackable with our BTN.S.AAS degree program.As of fall 2016, Proctor and Gamble and other major biotechnology industries in our region are now hiring applicants with the BTN.S. AAS degree for both internships and full time employment. In the past, these major companies required at least a bachelor’s degree, however, they were having difficulty maintaining employees for entry level jobs. This relationship with P&G may encourage other biotechnology industries to hire associates degree holders, thereby, increasing employment opportunities for our BTN graduates. |

**Section II: Assessment of General Education & Degree Program Outcomes**

For the FY 2016-17 Annual Update, departments are asked to provide assessment results for **Information Literacy**.

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| **General Education Outcomes** | Year assessed or to be assessed. | Course identified by the department where this outcome could be assessed | Assessment MethodsUsed | What were the assessment results? (Please provide brief summary data) |
| Information Literacy | **2016-2017** | **BIO2235** – Genetics; **BTN1110** - Biotechnology & Bioethics | **BIO 2235 Genetics**Used the provided information literacy rubric to assess student research papers Spring 2016**BTN 1110 Biotech & Bioethics**Faculty assessed information literacy based on graded discussion forums | **BIO 2235 Genetics**1. Pose valid research or discovery question
* 89.3% of students scored “competent” or higher

2.       Organize and integrate information and use information ethically* 78.6% of students scored “competent” or higher

3.       Select sources to support an idea that are appropriate, credible and relevant * 46.4% of students scored “competent” or higher

Note: In BIO 2235, the instructor is reviewing reliable information sources for scientific information.  She is using a three pronged approach. In class by first showing students reputable websites (NIH, CDC, Pubmed...), then discussing what to look for in assessing whether a website is reputable and finally administering a short assessment for the students to complete mid April.  The instructor will also review the reference pages of research papers that are turned in during Spring 2017 semester using the Information Literacy rubric and will report the results.**BTN 1110 Biotech & Bioethics**Nine students out of sixteen scored 70% of better on required discussion forums in the course. |
| **NEXT YEAR:** |
| Computer Literacy | **2017-2018** | **BIO2235** – Genetics; **BTN1110** - Biotechnology & Bioethics |  |  |

The Program Outcomes for the degrees are listed below. Responses from previous years are provided below. **All program outcomes must be assessed at least once during the 5 year Program Review cycle, and assessment of program outcomes must occur each year**.

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| **Program Outcomes** | To which course(s) is this program outcome related? | Year assessed or to be assessed. | Assessment MethodsUsed | What were the assessment results? (Please provide brief summary data) |
| Communicate effectively in a variety of ways with varied audiences through: writing skills, oral communication skills, listening skills, reading skills, and computer literacy. | BIO-1171 BIO-1272 COM-2206 COM-2211 COM-2225 ENG-1101 ENG-1201  | 2012-13 | The biology department offers a wide assortment of assessment methods concerning communication. These include, but not limited to, group discussions, essay questions, group project presentations, online discussion forums and 10 plus page reports and lab notebooks. | Brief assessment results are not the overall success rates, as students have a trend to do well in this particular assessment but overall success rates are lower than the following data.For Biology 1171 and 1272, roughly 95% of the students who complete the 10 plus page genetics lab earn a C or higher.For Biology 1171 and 1272, roughly 95% of the students earn a C or higher on written lab reports.For our BTN students, assessment in communication is roughly 45% of the overall grade. Roughly 80% of those who complete the written and oral areas of the class receive a C or better on the assignment (s).For Microbiology, a portion of the overall grade requires group reports and presentations. Roughly 97% of those who complete this work receive a C or better on the assignment.For Physiology, the writing assignment includes a guide "Writing Biomedical Research Papers" and the class average on the assignment was 95 %For our various A&P classes, discussion forums and group presentations alloted for a small portion of the overall grade, but those who successfully completed such assignments earned a C or better on the assignment. |
| Demonstrate a strong foundation in the natural sciences and the reasoning skills needed for successfully executing laboratory protocols. | BIO-1171 BIO-1272 BIO 1111/1211All BTN courses | 2013-14 | Assessments are given in the form of exams. Besides basic knowledge questions, all full time and part time faculty include a variety of questions involving problem solving and critical thinking on such exams | Competency in laboratory protocols and skills in BIO 2205/2206 Microbiology are assessed by successful completion of weekly quizzes, multiple lab practicals and identification of three unknown microorganisms. On average, 95% of students earn a C or higher in the microbiology lab.For BIO 1171 and BIO 1272 Majors Biology, competency in lab protocols are assessed using multiple laboratory practicals. On average, 59% and 52% of students earn a C or higher on the lab exams in BIO 1171 and BIO 1272 respectively. For BIO 1107/1108, competency in lab protocols are assessed using multiple laboratory practicals. On average, 65% of students earn a C or higher on the lab exams.For BIO 1141/1147 and BIO 1242/1248 Anatomy and Physiology, competency in lab protocols are assessed using multiple laboratory practicals. On average, 46% and 50% of students earn a C or higher on the lab exams in BIO 1141/1147 and BIO 1242/1248, respectively. For BIO 1111/1117 and BIO 1211/1217 Non-majors Biology, competency in lab protocols are assessed using multiple laboratory practicals. On average, 54% and 50% of students earn a C or higher on the lab exams in BIO 1111/1117 and BIO 1211/1217, respectively. On average, 78% of Biotechnology students earn a C or higher on the lab practicals in all Biotechnology lab courses. |
| Demonstrate knowledge of various experimental systems, including bacterial cultures, mammalian cell cultures and recombinant DNA technology. | BIO 1171BIO 1272BTN-1140 BTN-2230  | 2015-16 | This outcome is specifically addressed in our biotechnology, microbiology and majors biology courses. Students are assigned and “unknown” bacteria. They are then required to culture the cells and design a series of experiments to determine the strain of bacteria. In all three courses (biotechnology, microbiology and biology majors), students perform a pGLO experiment in which recombinant DNA technology is used to transfer a bioluminescence gene of a jellyfish into a bacterial culture. Students are then required to develop a formal laboratory report detailing the steps and conclusions of the experiment.  | In BTN 2230 Molecular Biology Techniques, test 2 assessed students’ knowledge of recombinant DNA. On average 68% of students earned a “C” or higher on the exam.In BIO 2206 Microbiology Lab, students are assessed on their knowledge of lab skills and experimental design by correctly identifying an “unknown” bacterial species. On average, 98.5% of students earned a “C” or higher on this assignment.In BIO 1272 Principles of Biology, students are assessed on their knowledge of recombinant DNA by writing a lab report on their observations, results and conclusions from the pGLO Transformation lab. On average, over multiple sections, 87% of students earn a “C” or higher on the lab reports.In BTN 1141 Cell Culture Techniques Lab, knowledge of mammalian cell culture and transfections are assessed using traditional and practical lab exams. On average, 99.7% of students earned a “C” or higher on this assessment.  |
| Demonstrate the ability to think logically and demonstrate problem solving using analysis, synthesis and evaluation. | BIO-1171 BIO-1272BIO 1111BIO 1211All BTN Courses  | 2014-15 | Assessments are given in the form of exams. Besides basic knowledge questions, all full time and part time faculty include a variety of questions involving problem solving and critical thinking on such exams | On average, 66% of students enrolled in BIO 2205 Microbiology earn a C or higher on lecture exams.For BIO 1111/1117 and BIO 1211/1217 Non-majors Biology, 69% of students earn a C or higher on the comprehensive exams.For BIO 1121 and BIO 1222 Human Anatomy and Physiology, 56% and 63% of students earn a C or higher on the comprehensive exams, respectively.On average, 55% and 54% of students enrolled in BIO 1141 and BIO 1242 A&P, respectively, earned a C or higher on lecture exams.For BIO 1171 and BIO 1272 Majors Biology, 61% and 67% of students earn a C or higher on the lecture exams, respectively.On average, 64% of Biotechnology students earn a C or higher on the comprehensive exams in Biotechnology courses. |
| Recognize and articulate an understanding of the increasing interdependence of world cultures and their consequences. | BIO 1272BIO 1211 | 2016-17 | This program outcome is addressed in our general biology and majors biology courses under the broad spectrum of evolution and population genetics. Students are taught how gene flow and increasing technology and mass transit have led to the gradual homogenization of once distinct human subpopulations. This concept can then be applied to the overarching theme of interdependence of world cultures in respect to genetics. Students in majors biology are required to complete a population genetics experiment as part of their normal course grade.  | For BIO 1272 Principles of Biology II, 70% successfully completed the population genetics experiment as demonstrated by their ability to successfully answer population genetics questions on an exam.BIO 1211 General Biology II (non-majors) is a required course for the BTN program. Data shows that 73% of students in this course successfully completed the population genetics experiment as demonstrated by their ability to successfully answer population genetics questions on an exam. |
| **Are changes planned as a result of the assessment of program outcomes? If so, what are those changes?**  | Students enrolled in our anatomy and physiology courses often find the lab practicals very challenging as indicated by the success rates on these exams in which, on average, only about 50% of students earn a C or higher in the lab section. In response to these findings, the Biology Department developed Division Initiatives that included the implementation of weekly lab quizzes starting Spring Semester 2015. The lab quizzes were added to the lab curriculum and assesses students comprehension of lab material learned in the previous week of lab.Lab quizzes are being administered on a weekly basis except for the days of a lab exam or the week following a lab exam. We are hoping that these weekly quizzes will better prepare students for the more encompassing lab exams, which covers aggregate material from several lab topics.No changes are planned as a result of the assessment of the program outcomes listed for 2015-2016.Update for 2016-17: a pilot study as a part of the RESPECT Learning Challenge Grant is being conducted in two sections of BIO 1141 Principles of Anatomy and Physiology I. In this study, faculty in these two sections have assigned specific students to groups to complete a published workbook in both lecture and lab that corresponds with the textbook. In addition to the workbook, students are also given weekly quizzes in the lab. Data is being collected Spring 2017 to determine if success rates on individual exams and the overall grade in these pilot sections have significantly improved compared to the other sections of the course. |
| **How will you determine whether those changes had an impact?**  | Anatomy and physiology faculty will continue to give quizzes, monitor the exam grades and discuss ways to modify the quizzes such as: adding multiple choice questions, increasing the number of questions on each quiz, or using different modes of question delivery to enhance lab exam grades. Lab quiz and lab exam scores will be collected from each section. Eventually, we will compare the overall success rate on the lab exams post lab quiz implementation with the success rate of lab exams prior to the use of weekly lab quizzes to determine if the lab quizzes are improving student comprehension. |

**OPTIONAL:**

Please use the space below to keep track of any annual data that your department wishes to maintain. This section is completely optional and will not be reviewed by the Division Assessment Coordinators.