**Sinclair Community College**

**Continuous Improvement Annual Update 2017-18**

**Please submit to your Division Assessment Coordinator / Learning Liaison for feedback no later than March 1, 2018**

**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, 2018**

**Department:** **SME - 0351 - Mathematics**

Year of Last Program Review: FY 2013-2014

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| **GOALS** | **Status** | **Progress or Rationale for No Longer Applicable** |
| **The department is close to completing the new pathway for Associate of Arts students, MAT 1340 Mathematical Reasoning and MAT 1445 Quantitative Literacy, known as Quantway®.** This new accelerated path allows arithmetic-ready AA-seeking students to complete their mathematics requirements in two semesters rather than the three semesters required in the traditional path, while providing them with a firm foundation in critical thinking skills for everyday life. Research into expanding Quantway®-modeled courses is also ongoing. | In progress [ ] Completed [x] No longer applicable [ ]  | MAT 1445 was approved as a Sinclair course and as an OTM course effective Fall 2014. It was offered in both Fall 2014 and Spring 2015, but did not run either time. However, students taking MAT 1340 have still been able to complete the requirements for the AA degree in two semesters by taking MAT 1440. At the outset of the Quantway initiative in 2009, the stated goal was to increase the number of students completing the math requirement for the AA degree by 50% over five years. That goal has been accomplished. In 2009, 148 students completed MAT 108 (the quarter version of MAT 1440) with a C or better. In 2014, 225 students completed MAT 1440 with a C or better. That is a 52% increase. (One should also consider that Sinclair’s overall enrollment declined during that same time period.) |

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| **A new course, Discrete Mathematics, is being developed in cooperation with the CIS department and Wright State University.**  This course will make possible an articulation between a CIS associate’s degree at Sinclair and a CS bachelor’s degree at Wright State. It will also provide students with a firm foundation in the composition of proofs and other advanced topics preparing them for upper level mathematics and computer science courses. | In progress [ ] Completed [x] No longer applicable [ ]  | The new Discrete Mathematics course, MAT 2570, was approved as a Sinclair course and as an OTM course effective Fall 2014. It was also approved by Wright State for transfer. MAT 2570 was offered in both Fall 2014 and Spring 2015, and it ran both times. This course was created to complete an articulation agreement between a CIS associate’s degree at Sinclair and a CS bachelor’s degree at Wright State. That articulation agreement was signed by both institutions in February 2015. |
| **The Associate of Science in Mathematics degree is being revised to more closely align the degree with bachelor’s degrees in math at neighboring institutions and to address current concerns about the number of credit hours required to earn Associate’s degrees.** Updated articulation agreements are being pursued as well with surrounding institutions, required due to the transition to semesters, paving a smoother transition to four-year schools for students. | In progress [ ] Completed [x] No longer applicable [ ]  | See page 2. |
| **Changes to the mathematics placement procedures and processes currently in place are being investigated.** There has been a great deal of evidence in recent years that the standardized testing currently in use is not an accurate predictor of student success. Such changes may include basic adjustments to cut-off scores, new placement tools, and/or additional support to students during the placement process. The goal of this investigation and any proposed changes is to ensure that students are moving to completion at the fastest rate possible. | In progress [x] Completed [ ] No longer applicable [ ]  | **Update for 17/18:** Beginning in 17/FA, Sinclair’s math placement test was changed from Accuplacer to ALEKS. There were two main reasons for this change. One, ALEKS begins by testing students over Intermediate Algebra-level material, and then adjusts the level of the questions up or down based on how they are doing. This keeps students who are competent in algebra from getting stumped on an arithmetic problem that they haven’t done by hand since grade school and then being under-placed. We tested this concept last year by changing Accuplacer so that students start on the Elementary Algebra test rather than the Arithmetic test. It was successful in making Accuplacer work better, even though Accuplacer was never designed to work that way. That suggested that we should move to a test that is actually designed to work that way. The second reason that we decided to move to ALEKS is that ALEKS creates a set of prep modules that are tailored to each student based on what they did and did not answer correctly on the placement test. The student can then access those prep modules on their own to use to help them prepare to retake the placement test. We know that many students underperform on placement tests because they either didn’t review at all, or they didn’t know what topics they most needed to review. ALEKS allows us to cast the first attempt at the placement test as really just being about figuring out what the student needs to review. After the student has reviewed, they can then come back and retest. In practice, a number of students in the fall did retest, and many of them successfully moved up a level. What we found in the fall was that 59% of students placed into the lowest possible math class (MAT 0050) on their first attempt. However, for students who retested once, that number dropped to 38%, and for students who retested twice, the number testing into the lowest level dropped to 22%. This is strong evidence that ALEKS can do for students what we expected it to do. Also, this doesn’t seem to have created a problem with students placing too high either. The success rate in the next higher math class, MAT 0100, seems to have actually gone up in the spring. We only have A-term data at this point, but in comparing Spring A-term to Fall A-term, the C or better rate in MAT 0100 increased from 40% to 54%. At the end of spring term, we will ask for RAR’s assistance in assessing our new ALEKS cut scores using spring success rate date, and determine if any of them need to be adjusted. **Update for 16/17:** Beginning 16/FA, the testing protocol in Accuplacer was changed so that students begin on the second level rather than the first level, and then either progress to the third level or go down to the first level depending on how they do on the second level test. The concern was that the first level of Accuplacer, which focuses on arithmetic, was unnecessarily placing students into DEV courses when they may have been successful in an algebra class like MAT 1270. Prior to the change, 70.5% of students were testing into DEV 0028 or below, and only 29.5% were placing into MAT 1270 or higher. After the change, these percentages changed to 48.5% and 51.5%, respectively. Both of these sets of percentages are based on groups of over 7000 students. Most of the students who were shifted from DEV to MAT wound up in MAT 1270. MAT 1270 went from accounting for 15% of testers to over 30%. However, even though we doubled the number of people testing into MAT 1270, the success rate in MAT 1270 only fell slightly, from 50% in 15/FA to 47% in 16/FA. **Update for 15/16**: Beginning 15/FA, the placement score for MAT 1470 was lowered from 69 to 50 on the College-Level Math test in Accuplacer. This was based on an analyses of three things: the test questions, success rates of students who placed into MAT 1470 vs. those who completed the prerequisite, and benchmarking data from colleges in other states. The Math Department is currently working on data analysis to assess the effectiveness of this change. That analysis should be ready before I submit the final draft of this Annual Update. The Math Department has also begun allowing advisors to refer students to the Math Lab for retesting if they believe that their Accuplacer score does not reflect their true readiness. They are then able to take the MyMathTest placement test. They may place higher, but even if they do not, the system generates an online study plan based on the problems they missed. They can then work on the study plan at home or even in the Math Lab. When they are ready, they can come to the Math Lab and retest. Beginning March 1, 2016, Accuplacer will be reconfigured so that students begin on the second math level (out of three), rather than the first. Depending on how they do, they may place into MAT 1270 or MAT 1370, or be moved to the first level (Arithmetic) or the third level (College-Level Math). The rationale is that the Arithmetic level might be tripping up recent high school grads who have been studying algebra, but have not been tested on arithmetic without a calculator for years. Hopefully, this initiative will see more students placing into MAT 1270 or higher.  |

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| **The department would like to more carefully analyze our offerings such as the STEM pathway, the new Finite Mathematics/Business Calculus sequence, and the Quantway® sequence, tracking students before and after the sequences and comparing them to earlier cohorts.** | In progress [x] Completed [ ] No longer applicable [ ]  | **Update for 17/18:** The Math Department’s work on pathways substantially ramped up this past year. With funding from ODHE through the Bridges to Success Grant, we built three co-requisite remediation courses from scratch and launched them all in Spring 2017. These co-requisite classes were paired with all face-to-face sections of MAT 1445—Quantitative Reasoning, MAT 1450—Introductory Statistics, and MAT 1470—College Algebra (excluding CCP Restricted sections in high schools). These courses are designed to allow students to skip the last remedial algebra class that they would have had to take before getting to these entry-level, transferable courses, but get enough remediation as they go to hopefully perform nearly as well as students who were fully prepared and didn’t need the co-requisite class. The goal was to increase the number of students succeeding in these three classes without having a negative impact on their overall success rates. The results have been everything that we hoped for. We can see that by comparing calendar year 2016 (SP/SU/FA) to calendar year 2017 (SP/SU/FA). No co-requisites were in place during calendar year 2016, and they were in place for all of calendar year 2017. * In 2016, 1124 out of 2030 students in these three classes got a C or better—a 55% success rate.
* In 2017, 1544 out of 2753 got a C or better—a 56% success rate.

So, the number of students getting a C or better increased from 1124 to 1544—a 37% increase. At the same time, overall enrollment at Sinclair only increased by 0.6%. So, we succeeded in substantially increasing the number of students successfully completing these classes, without negatively impacting success rates at all. In the end, more than 400 additional students succeeded in college-level math classes in 2017 because of these new co-requisite courses. **Update for 15/16**: Here are some new data analyses that were done for 2015:1. For AY 15/16, MAT 1580 (Precalculus) became the math requirement for a number of Engineering Technology degrees, replacing either MAT 1280 and MAT 1290 (Technical Mathematics I and II) or MAT 1470 and MAT 1570 (College Algebra and Trigonometry). This change was motivated by a desire to reduce credit hours in these programs, and it seemed reasonable since comparable content would be covered, and MAT 1580 has success rates comparable to the other classes. However, there was concern that students in Engineering Technology programs might not perform as well in MAT 1580 as the transfer engineering and science majors who have been the primary groups taking this course. So, we looked at all students who got an A, B, C, D, or F in MAT 1580 in 15/FA. This included 26 students in Engineering Technology programs, and 151 other students. Our data collection method, which relied on the SROS screen in Colleague so that majors could be identified, did not capture students who received a W. So, we calculated a modified success rate for both groups: (A’s + B’s + C’s) / (A’s + B’s + C’s + D’s + F’s). For the Engineering Technology group, the modified success rate was 65.4%. For all other MAT 1580 students, it was 67.5%. The difference in these values isn’t even close to being statistically significant (even a 50% confidence interval centered on their difference contains 0). This data seems to contradict concerns that Engineering Technology students might not do as well in MAT 1580 as transfer students. Also, because so few programs still use MAT 1280 and MAT 1290, these courses have become increasingly hard to run this year. It may make sense for the remaining programs using MAT 1280 and MAT 1290 to switch to MAT 1580, and for MAT 1280 and MAT 1290 to be discontinued.
2. Beginning in 15/FA, the alternate prerequisite for MAT 1440 (Excursions in Mathematics) dropped from MAT 1370 (Intermediate Algebra) to MAT 1270 (Beginning Algebra). The primary prerequisite continues to be MAT 1340 (Mathematical Reasoning, or Quantway I). This change was made in response to changes in state rules allowing Transfer Module math courses to have a prerequisite lower than Intermediate Algebra. Sinclair had previously been given special permission to use MAT 1340 as a prerequisite for MAT 1440. (Essentially, MAT 1340 replaces both MAT 1270 and MAT 1370 on the pathway to MAT 1440.) While MAT 1340 students never performed as well in MAT 1440 as MAT 1370 students, overall we saw a substantial increase in the number of students completing MAT 1440 (as outlined in last year’s Math Dept. Annual Update). Quite simply, it is much easier for students to complete one prerequisite than two. However, MAT 1340 is not offered online, and does not have enough enrollment to run consistently at the regional centers, so there was still a desire to find a more suitable alternate prereq for MAT 1440. The change in state rules made MAT 1270 a logical choice. Wright State used Beginning Algebra as the prereq for their version of MAT 1440 for years. Also, the content of MAT 1440 seems to only require Beginning Algebra as a prerequisite. However, there was still some concern that MAT 1270 students might not perform as well in MAT 1440 as MAT 1340 students. So we compared students who took MAT 1440 in the fall after previously getting a C or better in MAT 1270 to students who took MAT 1440 in the fall after previously getting a C or better in MAT 1340. We looked at all students in either group who got an A, B, C, D, F, or W in MAT 1440. There were 51 students in the MAT 1270 group and 66 in the MAT 1340 group. Using the normal success rate measure of (A’s + B’s + C’s)/(A’s + B’s + C’s + D’s + F’s + W’s), the MAT 1270 group had a 57% success rate, and the MAT 1340 group had a 62% success rate. The difference in these values isn’t even close to being statistically significant (even a 50% confidence interval centered on their difference contains 0). So, there is no reason to conclude that MAT 1270 students don’t do as well in MAT 1440 as MAT 1340 students. Therefore, it seems that this prerequisite change was a reasonable course of action. However, MAT 1340 will continue to be promoted as the primary prerequisite for MAT 1440, because the success rate for MAT 1340 is consistently higher than the success rate for MAT 1270. For example, in 15/FA, the success rate of MAT 1340 was 61%, and the success rate of MAT 1270 was 50%, and that difference is statistically significant with 95% confidence.

It should also be noted that the number of students successfully completing MAT 1440 with a C or better increased 68%, from 85 to 143, when 15/FA is compared to 14/FA. Exactly half of the increase is from students who had previously completed MAT 1270 with a C or better. We will suggest that the other half of the increase to attributable to continued efforts by advisors to promote MAT 1440 as the primary choice for students in AA degree programs. This is wise, since the success rate of MAT 1440 consistently beats the success rate of the primary alternative, which is MAT 1470. For example, in 15/FA, the success rate of MAT 1440 was 57%, and the success rate of MAT 1470 was 50%, and that difference is statistically significant with 90% confidence. (The only notable exception to this among students in AA degree programs is Psychology students, who generally need to take MAT 1470 for transfer.)Here is some analysis that we did on the core STEM sequence in 2014. We looked at every student who took MAT 2270 (Calculus I) in 2014 and got a grade. The overall success rate for this group was 55%. Here’s a breakdown:* For students who had previously gotten a C or better in MAT 1580 (Precalculus), the success rate in MAT 2270 was 88%.
* For students who had previously gotten a C or better in MAT 1570 (Trigonometry), the success rate in MAT 2270 was 60%.
* For all other students, the success rate in MAT 2270 was 36%. (This group would include both students who placed into MAT 2270, as well as those who had transfer credit for MAT 1570 or MAT 1580. It is clear now that we should have subdivided this group.)

This data affirms the decision to promote MAT 1580 as the primary pathway to the calculus sequence, rather than taking MAT 1470 and MAT 1570 to cover the same content. MAT 1580 had roughly the same success rate as MAT 1470 for the 13/14 academic year, yet it gets the students to calculus one semester faster and, apparently, prepares them better. (The elevated success rate of MAT 1580 in 12/13 was due to requiring a B in MAT 1370 as the prereq, rather than requiring a C like we have always done for MAT 1470. For the same reason, MAT 1580 had very low enrollment in 12/13. In the fall of 2013, the prereq for MAT 1580 was changed to match the prereq for MAT 1470, and their success rates equalized.) Each semester, we have been increasing the number of sections of MAT 1580 offered, at the expense of MAT 1470 and MAT 1570. This data validates the continuation of that process. We will continue to monitor these numbers as MAT 1580 grows.   |

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| **Work is beginning on a more ‘standardized’ approach to MAT 1470, College Algebra, and MAT 1130, Allied Health Math.** Following the successful model of the MAT 1270/1370 sequence, standardized homework sets and supplemental materials will be added to the course. New departmental finals will be developed as well. The data and analysis resulting from this implementation has the potential to improve success rates and retention. | In progress [ ] Completed [x] No longer applicable [ ]  | **Update for 17/18:** The development of a co-requisite course for MAT 1470, as described in the previous section, essentially completes our work on standardizing that class. However, we essentially started over on MAT 1130 this past year. We convened an advisory committee of faculty from various programs in the Health Sciences last spring and met with them several times to get their ideas on how to make MAT 1130 better meet the needs of their students. This led to a new syllabus, a new textbook, CMT revisions, and new group-based classroom activities. A faculty member from Nursing who served on the advisory committee also helped quite a bit with the work of developing the new activities. I personally taught the new version of this class last fall, and I was very pleased with it. Every aspect of this course is now better targeted to the practical needs of Health Science majors. The old version of the course had some good content, but it also had a lot of content that only connected to the Health Sciences in pretty superficial ways. MAT 1130 is now much more focused on things that Health Science majors really do need to learn, like computing drug dosages and setting IV flow rates. **Update for 16/17:** As part of the Bridges to Success grant from the Ohio Department of Higher Education, we developed a co-requisite course of MAT 1470 called MAT 0470—College Algebra Booster. Beginning in Spring 2017, every ftf section of MAT 1470 has a section of MAT 0470 paired with it. An online version of MAT 0470 will launch in 17/FA. We have been holding a series of meetings with faculty from several Health Science departments to evaluate the topics covered in MAT 1130 and ensure that we covering topics that are appropriate for their students. We will make revisions accordingly for the 17/18 academic year. This work was begun for MAT 1130 in Spring 2014, and it was completed and implemented in Fall 2014.Similar work was begun for MAT 1470 in Fall 2014, and is ongoing. The plan is to have it completed by Fall 2015. It is expected that there will be increased dual enrollment offerings of MAT 1470 this fall that are taught by the high school teacher. This standardization will help to ensure that students receive an experience similar to what they would receive if they took MAT 1470 on campus. **Update for 15/16**: All standardization work for MAT 1470 has been completed and implemented. For now, there has not been a change in success rates. However, item analysis from the new multiple-choice, departmental final exam has revealed topics that students are having the most difficulty retaining mastery of, and we will work to address that through review integrated throughout the course in the new standardized assignments.  |
| **Additional hybrid courses are envisioned, allowing students more flexible scheduling, and courses will be offered at new locations expanding access for students.** New courses will be developed as online offerings, such as MAT 1450 Introductory Statistics, and more flexible scheduling is planned as well, such as the new experimental MW daytime sections. The department is also experimenting with a video conference course offered simultaneously at all three learning centers in the spring of 2014, and hopes to extend this to other 200-level, low enrollment courses that the regional centers need to offer to complete transfer degree programs in business and engineering.  | In progress [x] Completed [ ] No longer applicable [ ]  | **Update for 17/18:** In Fall 2017 we launched online versions of the new co-requisite booster classes that were released in Spring 2017. We also launched online versions of the three new remedial algebra courses (MAT 0100, MAT 0200, and MAT 0300) that were created as a result of our merger this past summer with the DEV Math Department. We also launched Math Academy versions of MAT 0100, MAT 0200, and MAT 0300. This coming year, we are scheduled to begin work on a hybrid version of MAT 1450—Introductory Statistics, that should launch in Spring 2019. We are also currently building a co-requisite booster class for MAT 1460—Finite Mathematics for Business Analysis. This new booster will launch in both ftf form and online form in Fall 2018. **Update for 16/17:** The online version of MAT 1450 launched this past fall, and it accounted for 80 out of 204 students in this class. The 124 ftf students in MAT 1450 was still an increase over the previous fall semester, so the online version seems to have added new students to the course rather than cannibalizing the ftf course. We are currently working on new online courses for MAT 0445, MAT 0450, MAT 0470, and MAT 1445, and we revising the online versions of MAT 0100, MAT 0200, and MAT 0300. All of these developments/revisions will be ready for 17/FA. We began offering MAT 1365 as an online course in Spring 2015.Work will officially begin on creating online versions of MAT 1450 and MAT 1570 in summer 2015. These two new online courses will be offered for the first time in Spring 2016. MAT 2290 was offered (and successfully run) at Courseview for the first time in Summer 2014, which helped students to complete more credits toward the Engineering Transfer degrees (ESUP.S.AS), which is a featured program at Courseview.MAT 1460 was offered (and successfully run) at Englewood and Huber Heights for first time in Summer 2014. It was offered as a video conference class. In the fall, it was offered at both locations in the traditional format. This class prepares students for the math classes necessary for the Business Administration degree (BUS.S.AS), which is a featured degree at the learning centers. As a result, MAT 2160 was able to run in spring 2015 at ELC and HHLC as a video conference class. **Update for 15/16**: In 16/SP, we successfully offered and ran a video conference section of MAT 2180 (Business Statistics II) that included students at all four regional centers. MAT 2180 is required for the transferable Business Administration degree, but it has been difficult to make it run at Courseview, and it has never run previously at the other Learning Centers. MAT 1570 (Trigonometry) was offered online for the first time this spring, with one online section serving CCP students and one online section serving general population students. The online version of MAT 1450 (Introductory Statistics) is still in development and will debut in 16/FA. MAT 1450 will as be offered as a face-to-face class at the Huber Heights Learning Center for the first time this fall. This will be in support of the efforts to offer more Health Science programs at HHLC. We hope to next begin work on developing an online version of MAT 1355 for delivery in 16/FA.  |
| **In cooperation with the Tech Prep Program, the Mathematics Department is developing Tech Prep MAT 1370, Intermediate Algebra**, an Angel course to support high school instructors in the preparation of students for proficiency testing and for the delivery of the proficiency tests. This will be developed and implemented using the structure currently in place for Tech Prep MAT 1270.  | In progress [ ] Completed [x] No longer applicable [ ]  | This was completed during the 13/14 academic year.  |
| A future goal of the department is to have a more centralized department location with facilities for interactions between full-time and part-time time faculty, which would also allow mathematics students to interact with each other and with all faculty. | In progress [x] Completed [ ] No longer applicable [ ]  | **Update for 17/18:** We were able to bring one of the faculty members from the DEV Math Department, which merged with the Math Department last summer, over to a new office in Building 1. However, after that, a freeze was placed on reassigning former Health Sciences offices and classrooms, and we haven’t been able to bring anyone else over to Building 1. However, we were able to get a capital request approved to convert a former Health Sciences lab room in Building 1 to a Math classroom (old equipment needs to be removed and then the walls and floors have to be patched), so hopefully that room be available to us by Fall 2018. We also have three more capital requests pending for three other former Health Sciences lab spaces in Building 1. One of those requests would create a new space for adjunct faculty to work and meet with students between classes. **Update for 16/17:** The construction of the new HS building is on schedule, so hopefully we will have the opportunity to move on this goal this coming fall. Currently, a number of faculty from the Health Sciences Division have office space on the third floor of Building 1, near the Math Department Office and distributed among the majority of math faculty offices. When the new Health Sciences building is completed, presumably those faculty will get office space in the new building. Hopefully, this rare opportunity can be utilized to consolidate the offices of all math faculty and perhaps also the developmental math faculty. **Update for 15/16**: Earlier this spring the Math Department submitted an analysis to the SME Dean detailing opportunities to gain classroom and office space in Building 1 and Building 3 after the Health Science programs move to the new Building 14. There are a number of rooms that would be useful based on their locations to either Math or other SME departments.  |
| We would also like to increase attendance at the Mathematics Department Colloquia.  | In progress [ ] Completed [x] No longer applicable [ ]  | On quarters, we had one colloquium in the fall, one in the winter, and one in the spring. During the first academic year on semesters, (12/13), we just had one in the fall and one in the spring.Beginning in the 13/14 academic year, we have been having two in the fall and two in the spring, so we are now having more colloquia per year than ever. **Update for 15/16**: This academic year we achieved the highest cumulative attendance at department colloquia that we have seen since the conversion to semesters. The total for this academic year was 172, compared to 138 for 14/15, 170 for 13/14, and 101 for 12/13.  |

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** |
| Some of the assessment work the department has done been outstanding, particularly the efforts looking at scores on common exam items and making adjustments accordingly. The department’s work with adjuncts is exemplary. These are the kinds of best practices that should be shared with the campus community. The department is strongly encouraged to find ways of sharing these kinds of best practices, perhaps through workshops, presentations, and Faculty Forum articles. | In progress [ ] Completed [x] No longer applicable [ ]  | The department is looking into the possibility of giving a presentation as part of the New Chair Academy. If that doesn’t work out, we will investigate other possible avenues for sharing ideas. **Update for 15/16**: The Math Department Chair is scheduled to co-facilitate a session on managing adjunct faculty in April 2016 as part of the New Chair Academy series.**Update for 16/17:** The Math Department Chair did co-facilitate the session on managing adjunct faculty as planned, and has been invited to do so again this year.  |
| The department has cultivated excellent relationships with several four-year institutions – the Review Team was impressed by this and encourages the department to maintain these relationships. The department may want to explore whether relationships could be established with other transfer institutions. | In progress [ ] Completed [x] No longer applicable [ ]  | An articulation agreement with UD has been tentatively approved by their transfer officer, but still awaits formal signing by the Provosts of both institutions.We drafted a possible articulation agreement with Miami and sent it to them to review. Based on initial feedback from Miami, it appears that Sinclair’s requirement of a COM class will prevent this articulation agreement from being approved. **Update for 15/16**: This spring UD requested a renewal of our articulation agreement. We will also contact Wright State to seek a renewal of our two articulation agreements with them, because it has been two years and those agreements expire after the current academic year. **Update for 16/17:** Our articulation agreements with Wright State were updated on schedule this past year.  |
| The department has a relatively small number of graduates, which may make in-depth tracking of these graduates more manageable. In addition to transfer and employment data that RAR provides, the department is encouraged to leverage its excellent relationships with four-year institutions to get more feedback regarding its graduates. FERPA rules would likely prohibit the collection of grades for students who transfer from the program, but transfer institutions may still be able to provide valuable feedback regarding Sinclair Math graduates. Is there an opportunity to strengthen personal relationships that might make students more willing to keep in touch with the department as they transition to other institutions? | In progress [x] Completed [ ] No longer applicable [ ]  | In 2013, and 2014, the Math Department sent e-mails to all students who were enrolled in the MATE.S.AS program at that time and offered to connect them with faculty advisors. In total, 14 students took us up on that, which was about 25% of the active math majors.Starting in 2015, we will begin identifying each term all math majors who do not yet have a faculty advisor, and assigning a full-time faculty member to be their advisor. That advisor will take responsibility for reaching out to the student by phone, which is likely to have a better response rate than e-mail. Once all math majors have faculty advisors, we will begin having the advisors submit reports on each advisee each term which will cover things such as whether their advisee graduated or when they expect to graduate. For students who have graduated in a previous term, the advisor will attempt to contact them and get an update on their current status. **Update for 15/16**: We have begun to do the work described last year, and hopefully will have results to report on in future years. **Update for 16/17:** We are in the beginning of talks with Wright State to set-up a more systematic pipeline of students from our new Pre-Actuarial Science program to their new Actuarial Science program. **Update for 17/18**: Last spring we hosted a transfer-themed pizza party for math majors, which was attended by faculty and staff from Wright State University who shared information with our majors about their programs. We plan to do that again this year, and perhaps do it multiple times for multiple transfer institutions if we can find others that are interested.  |
| The MATE.S.AS program has three well-written outcomes. The Review Team recommends that the department consider development of a fourth program outcome related to transfer, since of necessity graduates of the program will need to transfer to be employable.  | In progress [ ] Completed [ ] No longer applicable [x]  | The reporting activity described in the previous box will hopefully enable us to get a better sense of where our graduates transfer to and whether they are successful after transfer. We are eager to understand this better, and will certainly report our findings in future annual updates. However, after consultation with our Dean, we have decided not to create a new program outcome. As we understand it, program outcomes must be linked to specific classes, and this worthy goal does not seem to fit with that.  |
| In the discussion with the Review Team, the department mentioned the possibility of making the MATE.S.AS degree more flexible to allow for different emphases within the degree. The department is strongly encouraged to explore this possibility, and to inform students regarding different career pathways that might exist for students pursuing a Math degree. Are there trends in the job market that might influence students to move in different directions within Mathematics? | In progress [ ] Completed [x] No longer applicable [ ]  | See Page 2. |
| It emerged in the discussion with the Review Team that the Math Department is currently gathering a tremendous amount of data that could be used to assess general education and program outcomes. While the self-study did not contain much in the way of analysis and reporting of this data, it appears that this is occurring, and specific examples of this were shared in the Review Team meeting. As mentioned previously, the standardization of assignments and exam items places the department in a strong position for assessment work. It may be that the department is currently doing more assessment than it realizes, which would explain why more of the results of these efforts weren’t included in the self-study. The department is encouraged to formalize the collection, analysis, and reporting of this assessment data, and provide evidence of this yearly as required by Section III of the Annual Update report that is submitted to the dean and the Provost’s Office.  | In progress [ ] Completed [ ] No longer applicable [x]  | The department does not agree that “the self-study did not contain much in the way of analysis and reporting of this data.”We have processes in place for collecting data related to our program outcomes, and that data was reported and analyzed in our self-study. Like all departments, we will be developing processes this year and next year for collecting data related to the general education outcomes.  |
| The Review Team noted that the perspective of students was not included in the self-study – what feedback does the department have from students? What are students saying about the department, and how can that be used for program improvements? The department is encouraged to collect student feedback and include student voices in the next self-study in five years. | In progress [x] Completed [ ] No longer applicable [ ]  | Beginning in 2015, the department chair will begin conducting exit interviews with graduating math majors so that this feedback can be collected. **Update for 15/16**: No exit interviews have been conducted yet, although the department did survey all students in MAT 2280, MAT 2290, MAT 2310, MAT 2320, MAT 2330, and MAT 2570 (a total of 201 students) this spring in order to gauge interest in a potential baccalaureate program, and also to better understand where Math majors and other STEM majors are transferring to currently. **Update for 16/17:** Our work with Wright State on the Pre-Actuarial Science/Actuarial Science pipeline should produce some fruit in this area. **Update for 17/18**: This spring we will begin doing exit interviews each term with students in MAT 2320—Linear Algebra, which is one of the last classes that students pass through as they complete the MATE.S.AS degree or the ACTU.S.CRT certificate.  |

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| The Math Department offers several 5 credit hour courses that are offered as 4 credit hour courses at Wright State University (for example, Calculus I). Currently the Ohio Board of Regents is requiring Ohio public institutions to reduce the credit hours totals for their programs, and several departments have indicated that they had difficulties with reducing credit hour totals for their programs because of 5 credit hour MAT courses. Of more concern, it would seem that we place students in a situation where they will inevitably lose a credit hour when they transfer in these situations. The department is encouraged to analyze where the majority of our students will be transferring, and to seriously consider whether our students wouldn’t be better served by alignment between the number of credit hours we require for these courses and the credit hours of the transfer institutions where the greatest number of our students will be transferring. The department has a strong history of doing what is best for the student, and it is hoped that careful consideration of the credit hour question will be guided by this core value that the department holds. | In progress [ ] Completed [ ] No longer applicable [x]  | There are currently three programs at Sinclair which use Calculus I: * Mathematics--MATE.S.AS (60 hours)
* Chemistry--CHEE.S.AS (61 hours)
* Engineering--ESUP.S.AS (60 hours)

The majority of students who take calculus at Sinclair transfer to Wright State, where the three calculus courses are each 4 credit hours rather than 5. Reducing our classes to 4 credit hours would be desirable for both math and engineering majors. The three extra hours transfer to Wright State as general elective hours. While the BS degrees in math and chemistry have plenty of room for general elective credits, the engineering degrees do not. This change would free up three credit hours, which the ESUP.S.AS program could use to add a multicultural elective, which would in turn allow engineering transfer majors to complete more of Wright State’s Core Curriculum as part of their Sinclair degree.This reduction in credit hours would also benefit the math program, as it would free three credit hours which could be used to add a new course to the MATE.S.AS degree. When we sat down with Wright State to work on our articulation agreements, the only problem they noted was that we lacked an equivalent for their MTH 2800—Writing Mathematical Proofs. This course is ordinarily taken by WSU students during the second semester of their second year, in order to prepare for a sequence taken the junior year which has MTH 2800 as a prerequisite. WSU only offers this class in the spring semester, and we believe that if we offered it in the summer, a combination of our native students and WSU transient students would make it a viable offering. However, there is one problem. Like UD, Wright State was only able to convert their calculus classes from five credit hours to four credit hours by reorganizing these classes into a three hours lecture with two hours of lab format. The content of the Calculus sequence requires five contact hours per week. However, some of the concepts taught could be covered through lab activities that would take place in a computer lab where students have access to software such as Mathematica or Maple. That is how Wright State and UD do it. In order for the Math Department to move in this direction, we would need a dedicated, 30-seat computer lab for calculus classes (comparable to what Wright State has), along with 30 student licenses for Mathematica or Maple (which would cost about $3000 per year). There is a complication with this request. The Math Department currently has three dedicated computer labs:* 13-121 (used for Quantway classes)
* 10-311 (used for statistics classes)
* 11-442 (used for tech math and statistics classes)

We expect to lose two of these three rooms to expansion projects taking place in Buildings 10 and 13 next year. So, we already need the college to allocate two more dedicated computer labs for the Math Department. A change in the Calculus curriculum would increase that request to three dedicated computer labs. **Update for 15/16**: The Math Department still has not acquired the needed computer lab described last year. However, it is possible that such a lab could be constructed in one of the lab classrooms that will be vacated by Nursing after the Health Science programs move to the new Building 14. **Update for 16/17:** Any computer lab space acquired in the Health Science move will likely be used for Quantitative Reasoning courses.  |

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| While not discussed in the meeting with the department, in their subsequent meeting the Review Team wondered whether it might be worthwhile to re-examine the “one-year rule” that requires students to re-take MAT courses if more than a year has passed before progressing to the next MAT course. Initially the department did a superb job of using data to inform the change – does data still support the effectiveness of this policy, particularly given the change to semesters in the years since? The department may want to explore the option of requiring students to take a short refresher course rather than requiring them to re-take the entire semester-long MAT course. | In progress [ ] Completed [x] No longer applicable [ ]  | The one-year time limit policy on prerequisites for MAT courses has a one-time waiver built into it that makes the concern expressed here unnecessary. If a student has already used their waiver, they can still take the placement test. A deficiency of Accuplacer is that it provides no feedback, to the student or the college, on what content the student had trouble with on the test. MyMathTest, which is the alternative placement product which we are currently piloting, does not share this deficiency. It generates a study plan which students can access from home after they complete their placement test. The study plan focuses on material that the student did not test well on, so that the student can prepare for retaking the placement test.The one-year rule has done a good job of doing what it was designed to do. Prior to its implementation, virtually every MAT class contained students who were taking the class for the fifth time or more. When a student has been unsuccessful in a class once or twice, it is plausible that unexpected circumstances in their personal life were to blame. When a student has been unsuccessful four or more times, there are only two explanations:1. There is a large deficiency in their knowledge of the prerequisite material.
2. Some permanent aspect of their personal life is preventing them from being successful.

The second problem cannot be dealt with in any readily apparent manner, but the first one can be. It can be addressed by having the student retake the placement test and start over in a course that they are ready to take. The one-year rule makes it impossible for a student to take a class unsuccessfully more than three times before being required to retake the placement test. The problem of students taking a class unsuccessfully more than three times appears to have been completely solved by the one-year rule. It therefore has had a huge positive effect. Furthermore, it has no conceivable negative effect. Any student who has allowed more than one year to lapse between math courses, but is still genuinely prepared to take the next class, is covered by the waiver. If they have used the waiver previously, then at worst they will only have to take the placement test. |

**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) |
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| **THIS YEAR’S ASSESSMENT RESULTS** |  |  |  |

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| Computer Literacy | **2017-2018** | **MAT2290** - Calculus & Analytic Geometry III | An assignment was piloted in Fall 2017 in MAT 2290 (Calculus III) in which students used a computer graphing program to analyze multivariable functions. | No data was collected last fall, but we understand that the standard rubric for this outcome will be finalized this spring, and we plan to use it to collect data from the new MAT 2290 assignment this coming fall.  |
| **LAST YEAR’S ASSESSMENT RESULTS** |
| Information Literacy | **2016-2017** | **Ohio Transfer Module: Natural & Physical Sciences Elective** |  | **Update for 16/17:** The Information Literacy Assessment was administered to all sections of PHY 2201 during Spring 2017. 34 students completed the assignment. Of these students, 74% scored a C (70%) or better and 47% of the students scored a B (80%) or better.  |

**AVAILABLE GENERAL EDUCATION RUBRIC DATA FOR STUDENTS IN YOUR DEPARTMENT’S PROGRAMS:**

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) |
| Demonstrate critical thinking and problem solving by using calculus to solve application problems. | MAT 2280 | Every year | Common Final Exam Question, with Common Grading Rubric | The common final exam problem was evaluated for 9 criteria. Of the nine, the result that was the most concerning was that only 31% of students used appropriate upper and lower limits of integration. Identifying appropriate limits of integration is key to using the material in MAT 2280 to solve science and engineering problems. **Update for 15/16**: There were improvements in 5 out of 9 areas on the evaluation rubric this year, including the one we were most concerned about last year. The results were reported in a department meeting, and those who teach this course will continue working for improvement. **Update for 16/17:** This year we saw improvements in 7 of the 9 areas of our rubric, including a second consecutive improvement in the area of correctly identifying limits of integration, which was our biggest concern from the first year we used this assessment (2014). **Update for 17/18:** Data was collected from seven sections of Math 2280 spring and fall semesters 2017. A total of 109 students were evaluated on a common final exam question. The question required students to solve an application problem involving integrals. In order to solve the problem correctly, the students needed to remember a basic formula, know to use a definite integral, determine the upper and lower limits of integration, and use the fundamental theorem of calculus to evaluate the integral. They also needed to take into account units of measurement. Although both spring and fall semesters used the same common final exam question, the assessment tool varied from spring to fall. The total number of spring semester students was 47. Forty-one demonstrated that they knew the work formula for stretching/compressing a spring, but 4 of those did not correctly find the value of k for the formula. The fall students totaled 62. Thirty-three of those 62 students used the correct integrand. So for both spring and fall 99 (or 90.8%) knew how to begin the problem by finding and using the formula with the correct value for k. Out of the 99 students who had the correct integrand, 75 then found the correct anti-derivative. (About 75% of those who found the correct integrand, subsequently found the correct anti-derivative.) Finding the upper and lower limits of integration has been the most missed item in the past. This year 37.6% (41 out of 109) did this correctly. Consequently only 40 out of the 109 students arrived at the correct numerical answer. Clearly, finding the correct upper and lower limits of integration has a profound effect on finding the correct solution to the problem. As for units of measurement, 44 out of the 109 students knew the correct units for the answer.  |
| Effectively communicate a mathematical proof orally to a varied audience. | MAT 2320 | Every year | Oral Presentation | The average score on the oral presentation for students who took MAT 2320 in 2014 was 81%. We will use this number as a benchmark for comparison in future years. **Update for 15/16**: The average score on the oral presentation for students who took MAT 2320 in 2015 was 85%, which is a slight improvement over 2014. **Update for 16/17:** The average score for 2016 was 93.5%, which was an improvement over 15/16.  |
| Effectively communicate mathematical concepts using correct terminology and notation. | MAT 2270 | Every year | Beginning and End-of-Semester written assignments.  | In 2014, 28% of students who took MAT 2270 in the fall or spring showed improvement at the end of the semester when compared to the beginning of the semester. **Update for 15/16**: Beginning 15/FA, the MAT 2270 Written Assessment was redesigned to focus on proof-writing skills. Students were asked to complete the assessment in all sections of 2270 at the end of the term, and their work was graded and summarized according to a 9-point rubric. The data suggests that the aspect of proof-writing that students still struggle with the most at the end of MAT 2270 is verifying that the conditions of a theorem are satisfied. We discussed this in a department meeting, and will work individually to give this concept greater emphasis in class. **Update for 16/17:** This year we saw improvement in five of the nine areas on our rubric. Most significantly, we saw improvement in both areas that involve verifying that the conditions of a theorem are satisfied, which was our biggest area of concern last year. **Update for 17/18:** Data was collected from nine sections of Math 2270 spring and fall semesters 2017. A total of 152 students were evaluated on a common final exam question. The question required students to write a short proof for the Mean Value Theorem and then find the value of c, as described in the theorem. Out of the 152 students, 101 (66.4%) used complete sentences with proper grammar. And 98 (64.4%) wrote proofs which were clearly communicated. But only 55 (36.2%) provided valid arguments for their proofs. Hence most of our students could clearly express what they were thinking, but most of them did not know how to prove the conditions for the theorem. Only about half (51.3%) could find the value of c, as described in the theorem. In conclusion, as a department, we need to focus more on both proving the conditions for a theorem and on understanding the theorems. |

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| **Are changes planned as a result of the assessment of program outcomes? If so, what are those changes?**  | We will all use this data individually to improve our teaching.  |
| **How will you determine whether those changes had an impact?**  | By continuing to perform these assessments.  |

**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.