

The Mathematical Association of America (MAA) and The American Mathematics Association for Two-Year Colleges (AMATYC) are two professional associations which provide opportunities for faculty to share information and participate in workshops/conferences. Faculty are also involved locally through the Ohio Council of Teachers of Mathematics and the Ohio Math Association for Two-Year Colleges.

Master syllabi were revised in the following order: 2004: 101 and 102; 2005: 105, 106, 108, 109, 116, 117, 121, 122, 131, 132, 133, 141, 142, 201, 202, 215, 218, 216, 203, 204; 2006: 143 designed for Education majors and covers an early and middle childhood sequence that can be transferred to Wright State University. Master syllabi are currently reviewed and revised concurrent with the textbook cycle. Detailed department teaching syllabi are also updated concurrent with the textbook cycle.

- II. **Program Learning Outcomes:** A description of what you intend for students to know (cognitive), think/feel (affective), or do (psychomotor), when they have completed your degree program. A suggested manageable number of outcomes should be in the range of five to ten. Describe Program Learning Outcomes review activities.*

The Liberal Arts and Sciences (LAS) program learning outcomes have been changed and approved at this time. Please refer to the section on the LAS degrees for more information on the review process.

a. Program Learning Outcomes

The program learning outcomes for Liberal Arts and Sciences that are applicable to the Math sequence (MAT 101-102-108 and MAT 101-102-116) are:

Outcome I – Critical Thinking/Problem Solving

Students should have the ability to think logically and problem solve using analysis, synthesis and evaluation.

- Analysis
- Synthesis
- Evaluation
- Judgment
- Reflection
- Awareness of one's own value in making choices

Outcome II – Global Awareness

Students should recognize and articulate an understanding of the increasing interdependence of world cultures and their consequences.

- The role of technology and change

Outcome IV – Professional Effectiveness

Students should demonstrate responsibility and accountability in accomplishing goals.

- Demonstrate punctuality, reliability and perseverance

- Demonstrate the ability to plan and organize tasks

Outcome V – Communication

Students should be able to communicate effectively in a variety of ways with varied audiences.

- Writing skills

b. End-of-sequence learning outcomes for Math

The end-of-sequence learning outcomes for MAT 101-102-108 are:

- Apply mathematical models to real world problems.
- Discuss the use of contemporary mathematics in real world applications.
- Gain a basic familiarity with a broad range of mathematical fields.
- Manipulate Algebraic expressions and solve equations at the intermediate Algebra level.

The end-of-sequence learning outcomes for MAT 101-102-116 are:

- Manipulate Algebraic expressions and solve equations at the intermediate Algebra level.
- Use functions and graphs of various types (polynomial, rational, exponential, logarithmic) to analyze relationships between variables and solve applied problems from many disciplines.
- Find roots of polynomial equations.
- Use the geometric properties of the conic sections to derive equations and graphs for these curves; use these equations and the curves' reflective properties to solve applied problems.
- Solve systems of linear and nonlinear equations by methods of substitution, elimination, Gaussian elimination and the inverse matrix method.
- Perform the matrix operations of addition, subtraction, scalar multiplication, matrix multiplication, and finding the determinant and inverse of a square matrix.
- Express infinite sequences and series.

III. Assessment Method(s): A measurable indicator of success in attaining the stated learning outcome(s). The methodology should be both reliable and valid. Please describe in detail.

- a. Formative Assessment Method(s) and Description: a measurable indicator of student in-progress success in attaining the stated learning outcome(s).

All students enrolled in Math 101, 102, and 131 are given a departmental diagnostic test on the first day of class; where as, 116 is given instructor-developed placement tests on the first class day. Students are advised to change courses if the results indicate that the student is not prepared for the course they enrolled in. The department is becoming more adamant that students are placed into the correct course based on their placement results. The faculty are making additional efforts to counsel students who need to change courses for proper placement. Some

faculty use student transcript information to aid in counseling students in addition to placement test results.

All students enrolled in Math 101 are required to complete a departmental final comprehensive examination. The results of the final examinations for all students enrolled in Math 101 have been collected on a quarterly basis since 1991. The exam for Math 101 was revised in Fall 1996 to coordinate the exam with curriculum changes brought about with adoption of a new text. Final examination averages are calculated for each class and shared with individual instructors. This provides faculty an opportunity to compare the results of their math class(es) with all other sections. Faculty can then evaluate the impact of changes they make in their learning facilitation strategies against measures of student performance. As well, the department can measure the impact of departmental efforts to improve student performance.

Since Winter of 1997 a final comprehensive exam and process similar to that used for Math 101 has been used for all sections of Math 102.

A comprehensive math test is administered at the conclusion of Math 108 and Math 116 as a means of end-of-sequence assessment. The test results must be calculated as part of the final course grade or used in some meaningful way by the instructor of the course. The test results are collected and a summary prepared by the Math faculty. These final tests were developed by the department and based on the overall objectives for each sequence. The summary data provides an overall picture of student performance levels. These final examinations have been administered since 1996 in Math 108 and in Math 116. The math department maintains a database to track performance in both Math 108 and 116.

- b. Summative Assessment Method(s) and Description: a measurable indicator of end-of-program success in attaining the stated program learning outcome(s).

Not applicable to end-of-sequence assessment.

Refer to the report at the beginning of Liberal Arts and Sciences for information on summative assessment of the program learning outcomes for Liberal Arts and Sciences.

IV. Results: A description of the actual results of overall student performance gathered from the assessment(s). (see III.a.)

The results from instructor-developed placement tests that are given on the first class meeting in Math 116 and departmental diagnostic tests given on the first class meeting in Math 101, 102, and 131 are shared with the student on an individual basis. In addition, the math department has special dispensation to allow students to go to a lower level math class for up to two weeks and back to a developmental math class up to the second day of the second week of the quarter.

The end-of-sequence assessment has been administered in Math 108 on a regular basis since 1994 creating enough historical data to allow trend analysis of the results. The average score of the MAT 108 assessment in the last two years (Fall 2004 thru Fall 2005) is 10.62 out of 20, down from an average score over the

previous six years (Fall 1998 thru Fall 2003), which was 10.87. The average score of the MAT 116 assessment in the last two years is 11.87, down slightly from the average score over the previous six years of 11.91 out of 20.

The average score on the Mat 101 final exam for the two academic years is 67.918%; this is up from a previous average score over the previous six years of 65.112%.

The average score on the Mat 102 final exam in the last two years is 64.622%; this is up from the average score over the previous six years of 62.609%.

Changes are difficult to interpret due to a wide range of possible influences such as textbooks, contact hours, and pre-requisites.

Annual Math Help Room and lab total student visits continue to rise as described in the table below.

Math Help Room and Lab visitation results since 1997

1997	1998	1999	2000	2001
10,717	11,739	13,917	15,803	16,788
2002	2003	2004	2005	
20,587	24,729	24,362	26,898	

- V. **Analysis/Actions:** From analysis of your summative assessment results, do you plan to or have you made any adjustments to your program learning outcomes, methodologies, curriculum, etc.? If yes, describe. If no, explain.

Students enrolling in Math 116 have a choice between either taking the course using graphing calculators or taking the course under traditional instructional methods. There is evidence to suggest that students going on to MAT 218 perform better if they have had a graphing calculator section of MAT 116 while those going on to MAT 122 or 201 perform better if they have had a traditional section.

The department has opened a Math Help Room staffed with faculty and tutors to give students access to one-on-one help with math courses. All full-time faculty are available in the Help Room at some time each two-week period. The Help Room is open all day long and gives students the opportunity to receive help in 200-level courses that are not supported through Tutorial Services. Students using the Help Room most frequently are registered in these courses (in order of usage): MAT 116, 102, 101, 202, 132, and 201. The department also supports a Math Lab where students have access to computers and lectures on video.

In the Winter of 2006, the Math Help Room was relocated to be closer to the Math Lab and was expanded in size to accommodate more students. This move allows the staff to oversee the two locations more efficiently as well as improve service to the students.

Since the fall of 1998, the Math department requires a grade of “C” or better for completion of the pre-requisite course. The students’ grades are checked during the course registration process.

The department has been involved in a SEM (Strategic Enrollment Management) project since 1999 to utilize a math retention specialist to increase student success in math. The department is happy to announce that as of fall 2005, the number of specialists increased to five. The specialists contact students who have been identified by math instructors as potential “D” or “F” students in lower level math courses. Several hundred phone calls are made every quarter. The retention specialists also conduct study skills workshops for students.

The department has initiated some activities specifically designed to entice and motivate students toward high achievement in mathematics. One activity is the “Problem of the Week” Contest. A college-algebra level problem is posted to all classes and the student with the most correct answers at the end of the quarter receives a prize. Another opportunity for high achieving students is participation in a student math competition for community college students sponsored by AMATYC. The students take an exam that tests their pre-calculus math ability as well as requiring quick, creative, innovative thinking skills. This is a national test with over 200 college participants that awards local prizes to the first and second place winners. In 2004 and 2005, over 150 students from Sinclair participated in the AMATYC math competition.

There have been a few changes made to the math curriculum based on formal and/or informal feedback. Math 151, Mathematical Modeling, was recently added to the curriculum. The statistics sequence, Math 122 & 220, now has a laboratory component to allow hands on demonstrations of statistical concepts throughout the course work. Special sections of the Technical Math sequence, Math 131 and Math 132, also include lab components as of fall 1999. New Winter of 2006 MAT 297, Introduction to Mathematical Proofs, was offered to upper level students to better prepare them for the transfer to a four-year institution. Those interested in the course include Math and Education majors.

In addition, the department will be hosting for the first time in Spring of '06 a high school invitational tournament.

Efforts are being made to improve placement into math courses on three fronts. A two year time limit on prerequisites and placement test results has been proposed. An Ad Hoc subcommittee of the Curriculum Committee is still reviewing the proposal. It has been recommended that students who register for a course while enrolled in the prerequisite, but who do not subsequently attain a satisfactory grade in the prerequisite, be purged from the course. Currently, the Instructional Counsel is considering a proposal that would allow faculty to administratively withdraw those students who were not attending and those who failed the prerequisite. And it has been proposed that students be required to satisfy math prerequisites even if it is their first quarter here at Sinclair.

Informal feedback from students, especially in Engineering, indicates they do well after they transfer from SCC to four-year institutions.

No formal surveys are administered by the Department to students or other parties. The Transfer Study administered by IP&R generally does not include any specific information that can be used by the Math faculty. The Department would like to be able to track the success of students who subsequently enroll in mathematics courses at four-year institutions.

VI. General Education: Are you using any tool(s) to assess any of the three primary general education outcomes * (communication, thinking, values/citizenship)? If so, describe.

- a. Where within the major do you assess written communication? Describe the assessment method(s) used. Describe assessment results if available.

Writing activities are being incorporated into classes by more Math faculty in a variety of courses. Students in MAT 122, 220 (Statistics sequence) are required to submit written lab reports.

- a. Where within the major do you assess oral communication? Describe the assessment method(s) used. Describe assessment results if available.

Oral presentations are being incorporated into classes by more Math faculty. Interactivity exercises used for teaching math also elicit more oral communication between students and faculty. MAT 141, 142, and 143 (Math for Education majors), MAT 122 and MAT 220 (Statistics sequence) and special sections of MAT 131 and MAT 132 (Technical Math sequence) all involve collaborative activities that elicit oral communication.

- a. Where within the major do you assess thinking? Thinking might include inventing new problems, seeing relationships and/or implications, respecting other approaches, demonstrating clarity and/or integrity, or recognizing assumptions. Describe the assessment method(s) used. Describe assessment results if available.

Thinking skills are the primary emphasis in the math program and courses. Problem solving and critical thinking skills are the major component of math. Math reinforces logic and reasoning based on its very nature. "Word problems" in math classes focus on problem solving skills. Thinking skills developed in math courses are also important to students for out-of-class problem solving that requires seeing implications and/or relationships.

- a. Where within the major do you assess values/citizenship/community? These activities might include behaviors, perspective, awareness, responsibility, teamwork, ethical/professional standards, service learning or community participation. Describe the assessment method(s) used. Describe assessment results if available.

Math 108, Math in the Modern World, touches upon issues related to values such as extended warranties, public opinion polls, etc. The faculty, within the department, emphasize values and citizenship through role modeling. The department sponsors a Colloquium once a quarter to host a speaker from the community. Student participants in the The American Mathematical Association of Two-Year Colleges (AMATYC) Math Competition gain a greater appreciation for professionalism through their involvement in the national Math competition.

b. Computer and information literacy

Math students are expected to both access and manipulate information. The use of graphing calculators has become more commonplace in the Math classroom. The Math Lab allows students access to computer-based tools that can be used to assist in discovering the answer to math problems. Four web-based math offerings are now available: MAT 101, 102, 105, 116 as well as two video courses: 101, 102. All students taking the “practice” chapter tests for Math 101 and 102 do so utilizing computer resources available in the Math Lab.

There is an interest in offering web-based courses in MAT 121 and 122 but a waiting list may prohibit moving forward at this time.