

**MICHIGAN TRANSFER AGREEMENT MATH TASKFORCE**  
**REVISED RECOMMENDATIONS FOR THE MTA MATH REQUIREMENT**  
**January 2014**

This document represents the final recommendations for the Math requirement for the Michigan Transfer Agreement (MTA). The first two pages of this document comprise the final recommendations for the three math pathways for general education —College Algebra, Statistics, and Quantitative Reasoning. The final two pages of this document provide the background on the MTA and the creation and members of the Math Taskforce. These final recommendations for the Math requirement will be embedded within the larger set of recommendations for the MTA that were finalized and submitted to the Michigan legislature last fall.

**Math Pathways Revised Recommendations**

**College Algebra Pathway - For students proceeding to programs that specifically require background in algebra, particularly STEM programs.**

*Statement on Prerequisites:*

- For success in the College Algebra Pathway a college level course has a prerequisite skill level of intermediate algebra or high school algebra II or equivalent content. Students will be expected to apply advanced algebra skills.
- This course must be beyond Intermediate Algebra.

*Topics/content that should be a part of a course in this pathway:*

- Functions, polynomials (including polynomials of degree greater than 2 and the fundamental theorem of algebra), rational functions, logarithms, exponential functions, inverse functions, and graphing by recognition and transformation rather than by plotting points. Pre-calculus topics such as sequences and series may also be included.

*Descriptors to consider for this pathway:*

- This course (possibly in conjunction with a separate course on trigonometry) would qualify a student to take a calculus course
- This course should be one that your mathematically capable student would start with after completing high school Algebra I and II
- This course should provide a strong foundation for critical mathematical thinking
- Many students in this pathway will have additional math courses required for their program; if a college-algebra-type course is a prerequisite for that course, students who are ready to begin with that course might be able to use it for meeting the math requirement.

*Guidelines from the Mathematics Association of America:*

- College Algebra provides students a college-level academic experience that emphasizes the use of algebra and functions in problem solving and modeling, provides a foundation in quantitative literacy, supplies the algebra and other mathematics needed in partner disciplines, and helps meet quantitative needs in, and outside of, academia. Students address problems presented as real world situations by creating and interpreting mathematical models. Solutions to the problems are formulated, validated, and analyzed using mental, paper and pencil, algebraic, and technology-based techniques as appropriate.
- Link: <http://www.maa.org/sites/default/files/pdf/CUPM/crafty/CRAFTY-Coll-Alg-Guidelines.pdf>

### **Statistics Pathway - For students proceeding to programs in business or social sciences.**

#### *Statement on Prerequisites:*

- The Statistics Pathway will satisfy the MTA requirements for general education.
- For success in the Statistics Pathway a college level course has a prerequisite skill level of at least beginning algebra or high school algebra I or equivalent content. Students will be expected to apply basic algebra skills.

#### *Topics/content that should be a part of a course in this pathway:*

- Probability, descriptive statistics, and inferential statistics, including hypothesis testing, p-values, confidence intervals, and linear regression. The course should incorporate both formula-based and technology-based approaches to statistics.

#### *Descriptors to consider for this pathway:*

- This course must go beyond descriptive statistics
- The course can be algebra-based or calculus-based
- The course must be taught and organized by someone from the Math (or Statistics) department or be cross-listed as a Math (or Statistics) course
- The course should be conceptually driven from a Math perspective

#### *Guidelines from the American Statistical Association:*

- The best thinking about introductory statistics courses is that students should focus on statistical thinking. The Guidelines list goals of the statistics course, which form the minimum expectations for an MTA statistics course.
- Link: [http://www.amstat.org/education/gaise/GAISECollege\\_Goals.pdf](http://www.amstat.org/education/gaise/GAISECollege_Goals.pdf)

### **Quantitative Reasoning Pathway - For students proceeding to programs not requiring statistics or calculus.**

#### *Statement on Prerequisites:*

- The Quantitative Reasoning Pathway will satisfy the MTA requirements for general education.
- For success in the Quantitative Reasoning Pathway a college level course has a prerequisite skill level of at least beginning algebra or high school algebra I or equivalent content. Students will be expected to apply basic algebra skills.

#### *Topics/content that should be a part of a course in this pathway:*

- Mathematical modeling and the use of reasoning to choose between competing models
- Numeric, symbolic, and graphical methods to handle a variety of applications
- Topics could include but are not limited to number sense and estimation, linear and non-linear models, financial models, symbolic logic, networks and graphs, probability and counting, statistical reasoning, voting theory, geometric models, similarity and scaling, and game theory

#### *Descriptors to consider for this pathway:*

- Building on the Kentucky guidelines articulated below, this course should help students communicate mathematical and/or statistical information symbolically, visually, and/or numerically.
- This course should also help students communicate a quantitative argument in writing.

#### *Guidelines borrowed from the Kentucky Council on Postsecondary Education:*

- The General Education Transfer Policy and Implementation Guidelines for Quantitative Reasoning (page 11):
  - ✓ Interpret information presented in mathematical and/or statistical forms.
  - ✓ Illustrate and communicate mathematical and/or statistical information symbolically, visually, and/or numerically.
  - ✓ Determine when computations are needed and to execute the appropriate computations.
  - ✓ Apply an appropriate model to the problem to be solved
  - ✓ Make inferences, evaluate assumptions, and assess limitations in estimation modeling and/or statistical analysis.
- Link: [http://cpe.ky.gov/NR/rdonlyres/6D7A8159-16D8-4810-A0B6-3D8161157D73/0/Revised\\_GE\\_Transfer\\_PolicyImp\\_Guidelines.pdf](http://cpe.ky.gov/NR/rdonlyres/6D7A8159-16D8-4810-A0B6-3D8161157D73/0/Revised_GE_Transfer_PolicyImp_Guidelines.pdf)

## Background on the Michigan Transfer Agreement and the Math Taskforce

Reacting to legislative language to improve the transferability of core college courses between two- and four-year institutions in the state, a committee comprised of community college and university representatives worked for the past year and half to revise the long-standing Michigan Association of Collegiate Registrars & Admissions Officers (MACRAO) agreement. After much deliberation and input from institutions, this committee submitted [recommendations for the new Michigan Transfer Agreement \(MTA\)](#) to the appropriate legislators to meet the mandated September 1, 2013 deadline. These are consensus recommendations that are intended to create a student-centered agreement that will streamline expectations for students and eliminate provisos, or exceptions, that have been commonplace with the current agreement. The next step of the process is for an ad hoc committee of the MACRAO organization to work through the implementation of this new agreement. This committee's work is well underway and the group has set an effective date for the new agreement for fall 2014. Additional information about the MTA implementation can be found on the [MACRAO website](#).

One of the outstanding issues identified in the MTA recommendations was the need to clarify the MTA Math requirement. To begin the process of defining the Math requirement, the Michigan Community College Association (MCCA) partnered with the Presidents Council, State Universities of Michigan (PCSUM) to convene two focus group discussions comprised primarily of community college and university math faculty and a handful of academic administrators. The group met on March 25 and June 10, 2013 to discuss the final MTA recommendations, which includes "One course in Mathematics." The focus group dialogues produced the draft proposal and rationale below, which were included in the report submitted to the legislature.

**IMPORTANT NOTE: This initial recommendation was intended as a placeholder for further discussions. The revised recommendations on pages 1 and 2 of this document supersede the initial proposal below and will serve as the final recommendations of the MTA moving forward**

*Proposal in the MTA Initial Recommendations: The one course in Mathematics to be satisfied by an entry-level college course\* in one of the following:*

- *College Algebra*
- *Statistics*
- *Quantitative Reasoning (a.k.a. Every day or Liberal Arts Math)*
- *An advanced level course in any of these areas will also be accepted.*

*\*A Mathematics course should be treated as an entry-level college course if students are expected to demonstrate mastery of Algebra I or content of equivalent rigor prior to enrollment.*

*Rationale:*

*This recommendation recognizes that students who follow diverse educational and occupational pathways need multiple points of entry into college level mathematics. It also recognizes the variety of mathematics requirements of the programs the students will transfer into. Students should be advised carefully when choosing a transfer program to ensure that they elect the appropriate math course. The group agreed that while there are fundamental levels of knowledge that indicate that a student is prepared for college-level mathematical study, not all students are well-served by being advised into a traditional algebra-intensive course sequence.*

Following the discussions of the focus group, there have been several opportunities for math faculty (and others) from two- and four-year institutions to weigh in on this draft proposal and the concept of math pathways rather than a singular math course to meet the MTA requirement. Several sessions were held over the past nine months to solicit input on this approach. The general view expressed in these sessions has been that the Math pathways are workable, but more specifics are needed to ensure that courses are available and can transfer to the universities.

#### **Process for Refining the MTA Math Requirements:**

To move this process forward and refine the above proposal, a MTA Math taskforce was formed to prepare a practical description of the math courses for each pathway. This group (listed at the end of this document) includes representatives from public community colleges and universities as well as an individual from an independent college. These individuals were selected in partnership between the leadership of MichMATYC, the Michigan Section of the Mathematical Association of America (MAA), as well as the MCCA and PCSUM. The charge of this group was to articulate the levels and types of competencies that will need to be included in each Math pathway at a sufficient rigor to allow the corresponding courses to transfer.

The recommendations on the next page will be circulated broadly to Math faculty statewide to solicit input. The goal is to finish this process and incorporate the refined Math requirements within the larger MTA implementation process by early 2014. The timeframe moving forward is as follows:

- December 2013 – Draft of refined MTA Math requirements circulated to Math faculty statewide
- January 2014 – Taskforce refines requirements based on statewide feedback and submits final Math requirements to MACRAO Ad Hoc MTA Implementation Committee
- March 1, 2014 – Mandated MTA Implementation report is submitted to the Michigan Legislature
- March-August 2014 – Roll out and implementation of MTA continues at the campus level
- August 2014 – Michigan Transfer Agreement goes into effect

#### **MTA Math Taskforce Members:**

- Todd Butler - Dean of Arts and Sciences, Jackson College
- Penny Cobau-Smith - Faculty, Adrian College
- Chris Gardiner - Math Department Chair, Eastern Michigan University
- Mark Gockenbach - Math Department Chair, Michigan Technological University
- Brian Goetz - Math Faculty, North Central Michigan College
- Jim Ham, Math Faculty, Delta College
- Michael Lachance - Math Department Chair, University of Michigan -Dearborn
- Doug Mace - Math Faculty, Kirtland College
- David Redman - Chair, Math Division, Delta College
- Dave Reinhold - Associate Provost for Undergraduate Education, Western Michigan University
- Jack Rotman - Math Faculty, Lansing Community College
- Pavel Sikorski - Math Associate Director of Undergrad Studies, Michigan State University
- Kirk Weller - Department Chair, Ferris State University