

General Education Mathematics in Michigan

Jack Rotman

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What We are Doing Now

Institution	Gen Ed Mathematics
Western Michigan	Excursions in Mathematics Finite Mathematics Survey of Mathematical Ideas Statistics and Data Analysis
Eastern Michigan	Mathematical Reasoning Linear Models and Probability Elementary Statistics [and 4 non-math courses]
Central Michigan	Quantitative Reasoning Intermediate Algebra
Wayne State	Mathematics in Today's World Intermediate Algebra
Michigan State	Finite Mathematics w/Coll Alg College Algebra and Trig
Ferris State	Intermediate Algebra Contemporary Mathematics
Grand Valley State	College Algebra Trigonometry Introduction to Mathematics

What We are Doing Now

Institution	Gen Ed Mathematics	Prerequisite
Western Michigan	Excursions in Mathematics Finite Mathematics Survey of Mathematical Ideas Statistics and Data Analysis	Algebra I
Eastern Michigan	Mathematical Reasoning Linear Models and Probability Elementary Statistics [and 4 non-math courses]	Elementary Algebra [non-math: No Prereq.]
Central Michigan	Quantitative Reasoning Intermediate Algebra	Elementary Algebra
Wayne State	Mathematics in Today's World Intermediate Algebra	Beginning Algebra
Michigan State	Finite Mathematics w/Coll Alg College Algebra and Trig	Intermediate Algebra
Ferris State	Intermediate Algebra Contemporary Mathematics	Fundamentals of Algebra
Grand Valley State	College Algebra Trigonometry Introduction to Mathematics	Intermediate Algebra

What We are Doing Now

Institution	Gen Ed Mathematics
Oakland Community College	Plane Geometry Intermediate Algebra Finite Math; College Algebra; Statistics
Schoolcraft College	Business Math Applications – Utility of Math Intermediate Algebra Elementary Statistics
Mott Community College	Math Approaches for Paraprof. Applications-based Mathematics Beginning Algebra Intermediate Algebra
Washtenaw Community College	Everyday College Math Technical Algebra; Basic Statistics Intermediate Algebra
Lansing Community College	Intermediate Algebra Math for Business; Art of Geometry Math – Applications for Living Technical Math II

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Institution	Gen Ed Mathematics	Prerequisite
Oakland Community College	Plane Geometry Intermediate Algebra Finite Math; College Algebra; Statistics	Elementary Algebra Intermediate Algebra
Schoolcraft College	Business Math Applications – Utility of Math Intermediate Algebra Elementary Statistics	Basic Math Beginning Algebra Intermediate Algebra
Mott Community College	Math Approaches for Paraprof. Applications-based Mathematics Beginning Algebra Intermediate Algebra	Basic Math Beginning Algebra
Washtenaw Community College	Everyday College Math Technical Algebra Basic Statistics Intermediate Algebra	Foundations of Math Foundations of Algebra
Lansing Community College	Intermediate Algebra Math for Business; Art of Geometry Math – Applications for Living Technical Math II	Introductory Algebra

Summary

“Branch” of Mathematics	Course Titles (Unique)
Algebra to Pre-Calculus (10 institutions)	Beginning Algebra; Intermediate Algebra College Algebra; Trigonometry College Algebra and Trig
Statistics (5)	Statistics and Data Analysis; Elementary Statistics Statistics; Basic Statistics
Finite Math/Trig/Combo (4)	Finite Mathematics; Linear Models and Probability Finite Mathematics w/Coll Alg
Liberal Arts/Survey (6)	Excursions in Mathematics; Survey of Mathematical Ideas Mathematics in Today’s World Contemporary Mathematics; Introduction to Mathematics Everyday College Math; Art of Geometry
Quantitative Literacy (5)	Mathematical Reasoning; Quantitative Reasoning Applications – Utility of Math Applications-based Mathematics Math – Applications for Living
Occupational Math (4)	Business Math; Math Approaches for Paraprofessional; Technical Algebra; Math for Business; Technical Math II

Obvious Patterns

- Divergence more than convergence:
Mathematics as science should show more convergence – are these mathematics courses, or merely barriers?
- Sub-set of pre-calculus sequence used:
If students do not need pre-calculus, are we filtering students (inappropriately)?

Conference Board (CBMS) Data, 2005

- Universities were only asked about quantitative requirement within their academic unit (not university-wide)
- Most commonly used courses

	Univ PhD	Univ MA	College (BA)
Pre-calculus or college alg	56%	61%	62%
Calculus	97	87	86
Statistics	55	60	66
Special Gen Ed course	52	73	55

CBMS Data (2005) Community

Colleges

- The CC survey did not ask about general education requirements – just enrollments
- Enrollments (thousands) for last 3 surveys

	1995	2000	2005
College Algebra	186	173	206
Pre-calculus	50	48	58
Statistics	69	71	111
Math – Liberal Arts	38	43	59
Other	0	14	28

SIGMAA-QL Survey, 2009

275 responses from four-year colleges (25%); two-year colleges not summarized (only 45 responses) [MAA Liaisons received survey]

Course	Rate	Course	Rate
Calculus	92%	College Trig	30%
Statistics	74%	Computer Science	25%
Math Lib Arts	60%	Statistical Literacy	19%
Pre-calculus	56%	Symbolic Logic	18%
Finite/Discrete	54%	Other QR or QL courses	17%
College Algebra	50%	Modern Math.	12%

Professional Standards

- MAA CUPM (Committee on Undergraduate Programs in Mathematics); 2004 – part II
 - Calls for us to examine the use of college algebra for general education purposes (pg 30)
- AMATYC Beyond Crossroads 2006 – chapter 6
 - Calls for us to collaborate with faculty from other disciplines to design appropriate general education mathematics (pg 44)

Framework for General Education

Content:

- Assume multiple branches of mathematics are needed ('general', not specialized)
- General education courses are not nested & sequential (Do not extract part of a sequence)
- General education courses deliver a mathematical experience (scientific)
- General education courses address the needs of client disciplines, and society at large
- General education courses contribute to the literacy of an educated person

Issue for the Framework: Prereqs

- We often use prerequisites as an indirect measure of ‘mathematical rigor’ for a course
- Indirect measures are a matter of correlation
- A college-level math prerequisite is not sufficient to ensure an appropriate rigor
- A college-level math prerequisite is not even necessary to ensure an appropriate rigor

Framework for General Education

Access, and Process:

- Set prerequisites low (these are not specialized content courses)
- Target first-year students (intent is to help students in other courses)

Framework for General Education

- Gen-Ed courses might be seen as ‘quantitative literacy’ or ‘quantitative reasoning’ courses
- We lack consensus, as well as definition, for these concepts
- As a profession, we need to have extended conversations about literacy & reasoning as part of the process of strengthening general education

References

- MAA CUPM 2004
http://www.maa.org/cupm/curr_guide.html
- AMATYC Beyond Crossroads
<http://beyondcrossroads.amatyc.org/>
- CBMS Surveys
<http://www.ams.org/profession/data/cbms-survey/cbms-reports>
- SIGMAA-QL survey 2009 on quantitative requirements
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.158.6128&rep=rep1&type=pdf>

Contact info

- Email rotmanj@lcc.edu
- Web site <http://jackrotman.devmathrevival.net>
- This presentation is available on my web site