Missouri Math Pathways Initiative

Mathematics is not something to be endured

- Rethink the value and applicability of mathematics
- An opportunity to reevaluate mathematics education in Missouri
  - Development of elementary education pathways
- HB 1042: Remove barriers and improve remediation
  - Define “readiness” and “remedial education”
  - Multiple measure for placement
  - Align gateway courses with programs of study

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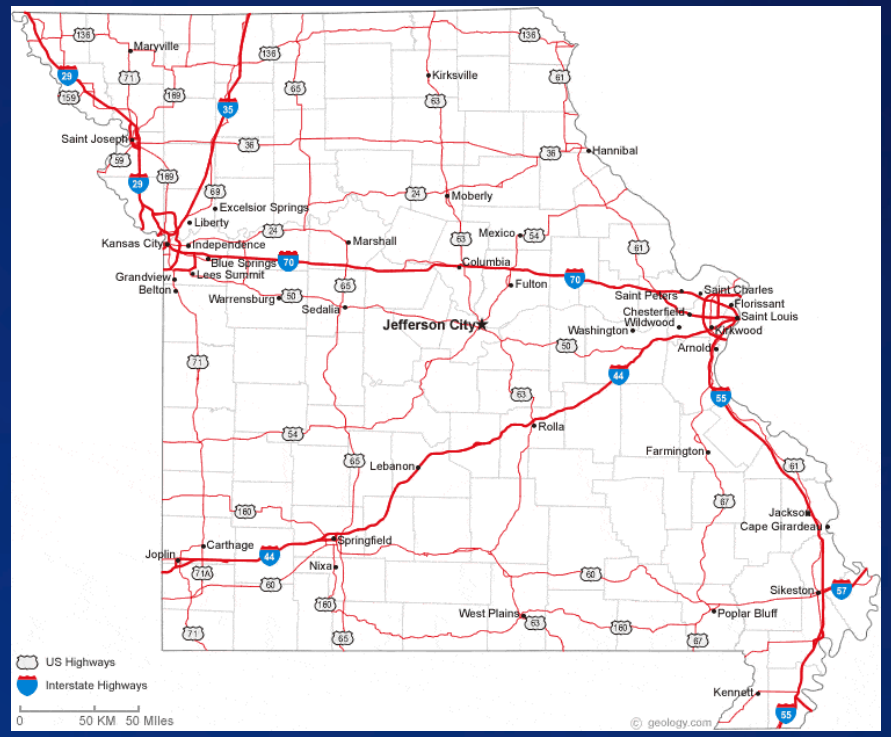
Missouri Math Pathways Taskforce



- Comprised of mathematics/statistics faculty
  - All 27 public institutions and 3 independent institutions
  - Since 2014, there have been 45 members of the Taskforce
- Met over 20 times, for well over 100 hours of in-person time
- Countless hours spent working on pathways subcommittees
- Faculty traveled for a combined 7,000 miles per meeting

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Statewide Challenges

The University of Missouri-Columbia

“We want students to see the beauty of the mathematics.”

Challenges:

- State Flagship institution
- College Algebra a graduation requirement
  - Institutional, not only departmental, decision
- Skeptical of pathways premise; but nonetheless engaged
- Statistics and Mathematics are separate departments

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The University of Missouri-Columbia

Overcoming Challenges:

- Call with Mizzou provost and academic affairs staff
  - MDHE, Dana Center, and University of Georgia (peer)
  - Leadership: good policy without compromising integrity of education
  - Modified institutional/graduation requirement
- Enrollment declines amid campus unrest
  - Reexamine institutional identity
  - Bring in more students, especially in transfer
- Change in department leadership

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Issues of Transfer

Challenges:

- Faculty concern about transfer and applicability
  - Community Colleges
  - Following Mizzou's lead
- Ensure rigor of each pathways courses
  - MDHE policy around intermediate algebra revised
- No additional burden on students

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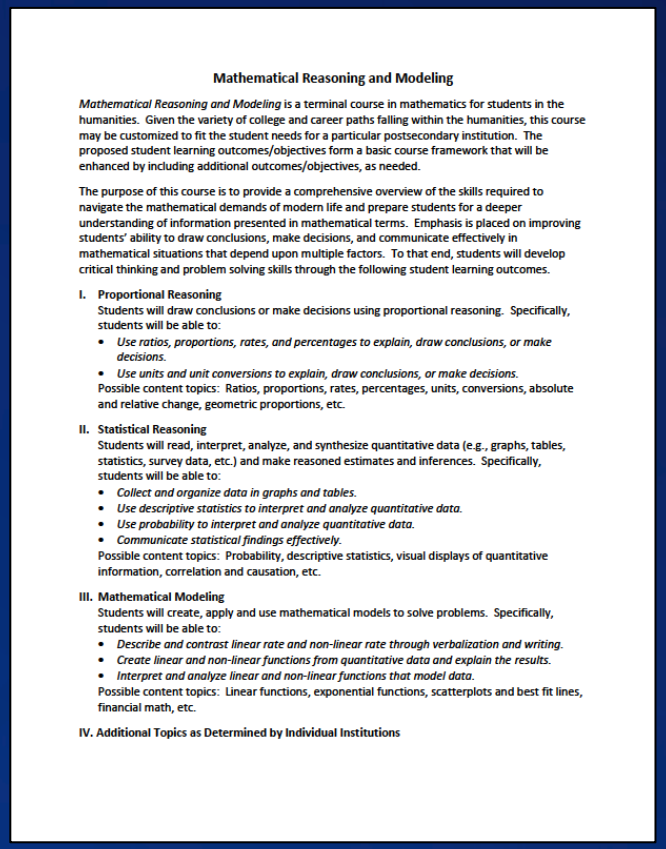
Transfer and Applicability



Mathematical Reasoning and Modeling

Mathematical Reasoning and Modeling is a terminal course in mathematics for students in the humanities. Given the variety of college and career paths falling within the humanities, this course may be customized to fit the student needs for a particular postsecondary institution. The proposed student learning outcomes/objectives form a basic course framework that will be enhanced by including additional outcomes/objectives, as needed.

The purpose of this course is to provide a comprehensive overview of the skills required to navigate the mathematical demands of modern life and prepare students for a deeper understanding of information presented in mathematical terms. Emphasis is placed on improving students' ability to draw conclusions, make decisions, and communicate effectively in mathematical situations that depend upon multiple factors. To that end, students will develop critical thinking and problem solving skills through the following student learning outcomes.

I. **Proportional Reasoning**
Students will draw conclusions or make decisions using proportional reasoning. Specifically, students will be able to:
- *Use ratios, proportions, rates, and percentages to explain, draw conclusions, or make decisions.*
- *Use units and unit conversions to explain, draw conclusions, or make decisions.*

Possible content topics: Ratios, proportions, rates, percentages, units, conversions, absolute and relative change, geometric proportions, etc.

II. **Statistical Reasoning**
Students will read, interpret, analyze, and synthesize quantitative data (e.g., graphs, tables, statistics, survey data, etc.) and make reasoned estimates and inferences. Specifically, students will be able to:
- *Collect and organize data in graphs and tables.*
- *Use descriptive statistics to interpret and analyze quantitative data.*
- *Use probability to interpret and analyze quantitative data.*
- *Communicate statistical findings effectively.*

Possible content topics: Probability, descriptive statistics, visual displays of quantitative information, correlation and causation, etc.

III. **Mathematical Modeling**
Students will create, apply and use mathematical models to solve problems. Specifically, students will be able to:
- *Describe and contrast linear rate and non-linear rate through verbalization and writing.*
- *Create linear and non-linear functions from quantitative data and explain the results.*
- *Interpret and analyze linear and non-linear functions that model data.*

Possible content topics: Linear functions, exponential functions, scatterplots and best fit lines, financial math, etc.

IV. **Additional Topics as Determined by Individual Institutions**

Solution: Student Learning Outcomes

- 4 courses for 3 distinct pathways
  - Precalculus Algebra and Precalculus
  - Statistical Reasoning
  - Mathematical Reasoning & Modeling
  - https://dhe.mo.gov/AAU-Initiatives-MathPathways.php
- SLO development, two year process
  - discussion, evaluation, modification, and compromise
- Review process for courses to be deemed equivalent

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Lessons Learned

What We've Learned

Key Take-Aways:

- Importance of faculty-led process
- Listen to and address concerns
- Work closely with various stakeholders
- Focus on student success

26

Out of 27 Public institutions set to over at least 2 pathways

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