KENT STATE
UNIVERSITY

INTERDEPARTMENTAL CORRESPONDENCE

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To: Dr. Donald Palmer, Interim Dean and URCC Co-Chair
From: Mary Ann Haley, Associate Dean, College of Arts and Sciences Mary Ann Haley
Date: November 30, 2016
Subject: College of Arts and Sciences Courses for URCC Review

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The following curriculum actions were approved at the November 17, 2016 meeting of the College of Arts and Sciences Curriculum Committee.

I. **Department of Mathematical Sciences**
   A. Establish Course:
      1. MATH 10051 – Quantitative Reasoning — Kent Core
         Request Kent Core status

II. **Department of Sociology/Sociology Program**
   A. Revise Course:
      1. SOC 32569 – Minorities in America — Dom Div
         Change title and abbreviation to Minorities in the United States
         Revise description and content
         Request Domestic Diversity status
   B. Revise Existing Diversity Courses:
      1. SOC 32565 – Sociology of Gays/ Lesbians — Dom Div
         Change title and abbreviation to Sociology of Sexualities
         Revise description and content
      2. SOC 42315 – Sociology of Changing Gender Roles — Dom Div
         Change title and abbreviation to Sociology of Gender
         Revise description and content
      3. SOC 42575 – Family Patterns: A World Perspective — GL Div
         Change title and abbreviation to Families in a Global Perspective
         Revise description and content

TRANSMITTAL MEMO:

To: Dean Mary Ann Haley, Arts & Sciences

From: Mark L. Lewis, Mathematical Sciences

We have one item:

1. Course creation of Math 10051: The state is revising the math paths for incoming students. The state has now put in place three possible paths. The first is algebra/calculus for stem majors (and only stem majors) (Math 11010, 11012, 11022, 12002, etc.). The second path is statistics (Math 10041). The third path that the state has established is a course in Quantitative Reasoning. The purpose of this proposal is to create a course in Quantitative Reasoning to meet this state requirement. I am attaching a detailed rationale for this course. We will apply for this course to meet the new Quantitative Reasoning requirement in the state Transfer Module and the paperwork is forthcoming. Since this will be in the transfer module, we are applying for Kent Core Status for this course. ~~Mandy~~ Associate Provost Mandy Munro-Stasiuk has told us that since this is a new state mandate that we are not required to withdraw an existing Kent Core course to make this a Kent Core course.

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Name: Lorna G Herdina Submission Date: 11/30/2016

Organization: Dean Arts & Sciences

Course Catalog Update

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Course Catalog Update Information: STU0004

Reference Number: CCU011370 **Date:** 07-NOV-16

Level: 3.00 **of** 3.00 **Currently On The Worklist Of:** Donald Palmer, dpalmer

Owner: Office of Curriculum Services, 330-672-8558 or 330-672-8559, curriculum@kent.edu

Basic Course Data

Change type: Establish

Faculty member submitting this proposal: Mark Lewis

Requested Effective Term: 201780

Campus: Kent

College: AS-Arts and Sciences

Department: MATH-Mathematical Sciences

Course Subject: MATH-Mathematics

Course Number: 10051

Course Title: Quantitative Reasoning

Title Abbreviation: Quantitative Reasoning

Slash Course and Cross-list Information:

Credit Hours

Minimum Credit/Maximum Credit: 4 to 4

Contact Hours: Lecture - Minimum Hours/Maximum Hours: 4 to 4

Contact Hours: Lab - Minimum Hours/Maximum Hours:

Contact Hours: Other - Minimum Hours/Maximum Hours:

Attributes

Is this course part of the LER, WIC or Diversity requirements: Yes

If yes, course attributes: 1. LMCR-LER-Mathematics and Critical Reasoning 2. 3.

Can this course be repeated for credit: No Repeat | **Course Limit:** | **OR Maximum Hours:**

Course Level: Undergraduate | **Grade Rule:** B-Standard letter

Rationale for an IP grade request for this course (if applicable):

Schedule Type(s): 1. LEC-Lecture 2. 3.

Credit by Exam: N-Credit by exam-not approved

Prerequisites & Descriptions

Current Prerequisite/Corequisite/Catalog Description:

Catalog Description (edited): In the broadest sense mathematics should provide students the needed quantitative tools, logical reasoning and problem solving skills, and a sense that quantitative modeling can be used to describe and understand developments in many areas of daily living. Since critical thinking is the primary objective and outcome for our course, in each area of concentration (numeracy, mathematical modeling, and probability and statistics) students will need to read and glean information from the problem situation, convert the information into a usable form, perform any needed routine calculations, make or draw a conclusion, and then communicate the result via explanation using quantitative reasoning by writing coherent statements and paragraphs

Prerequisites (edited): Minimum 22 math ACT score; or minimum 520 math SAT score; or minimum 35 ALEKS math assessment score; or minimum C grade in MATH 00022; or any higher-level MATH course.

Corequisites (edited):

Registration is by special approval only: No

Content Information

Content Outline:

Content Hours per Course Topic	Topic Description
14	Numeracy - Interpret different uses of percent - Solve percentage problems - Apply proportional reasoning skills to compare and contrast - Understand

	the difference between absolute change and relative change
22	Mathematical Modeling -General function knowledge -Linear Functions -Exponential and log functions
16	Basic Probability and Statistics -Distinguish between quantitative and qualitative data -Decide what or when each type of graphical display is appropriate for the type of data
8	Review and Exams

Display/Hide Delimited Course Outline

Total Contact Hours: 60

Textbook(s) used in this course: Quantway II, a program of the Carnegie Foundation for the Advancement of Teaching, Carnegie Math Pathways project

Writing Expectations: On a daily basis students will be completing activities where they must communicate their ideas orally then in writing for submission to be graded. There will also be longer term writing assignments such as a term paper.

Instructor(s) expected to teach: Ellen Mulqueeny, Yaser Daher, Other NTT and TT faculty

Instructor(s) contributing to content: Ellen Mulqueeny, Mark Lewis

Proposal Summary

Explain the purpose for this proposal:

Rather than continuing to place all students in traditional mathematics pathways there is a movement to match the right mathematics course to different majors. Students in many programs of study can be suitably prepared with alternative gateway math courses such as in Quantitative Reasoning. By offering alternate pathways in mathematics students are more likely to have good outcomes. Ohio's new TMM011 learning outcomes expectations provide an ideal impetus to launch radical changes to freshman mathematics, raise awareness and appreciation of the pervasive value of mathematical thinking, and to significantly improve student success at college and beyond.

Explain how this proposal affects program requirements and students in your unit:

Students in Mathematical Sciences should not be taking this course. This should not impact Mathematical Sciences students.

Explain how this proposal affects courses, program requirements and student in other units:

The primary student population of a Quantitative Reasoning course is typically students seeking a Bachelor's degree who do not need preparation in an algebra-calculus track. Our new Quantitative Reasoning course will target this population and emphasize core mathematical general education outcomes while increasing students' logical reasoning abilities ability to communicate quantitative ideas, and strengthen mathematical abilities that students will need in other disciplines.

Explain how this proposal affects enrollment and staffing:

We expect students taking this course otherwise have taken Math 11008, 11009, or 10772. We expect enrollments in those course to decrease over time, so this should have no net change on enrollment or staffing.

Units consulted (other departments, programs or campuses affected by the proposal):

None

Curriculum Services Information:

Approved by EPC:	**Curriculum Bulletin:**
Cross-list Banner Code:	**OBR Course Level:**
OBR Program Code:	**OBR Subsidy Code:**
CIP Code:	**Term Start:**
	Term End:

Comments (500 Character Maximum):

NOTE: Please do not use the following restricted characters: (~ * / \ --)

Comments:

Date	User	Comment

11/7/2016	Mark L. Lewis	No comments available.

History:

Date	User	Status
11/30/2016	Mary Ann Haley	Approved
11/7/2016	Andrew M. Tonge	Approved
11/7/2016	Mark L. Lewis	Submitted

Kent Core Course Proposal Questionnaire

Please review the Kent Core Policy Statement before completing and submitting the questionnaire to the University Requirements Curriculum Committee accompanied by a Course Catalog Update workflow and typical course syllabus.

Date: November 3, 2016

Department/School: Mathematics

Course ID: Math 10051 **Credit Hours:** 4

Course Title: Quantitative Reasoning

Prerequisite(s): For majors not needing Algebra and have an ACT score lower than 21 or an SAT score lower than 510; Successful completion of Math 10022 or ALEKS placement score of 35% of higher. **For majors not needing Algebra and have an ACT score 22 or higher and an SAT score of 520 or higher;** No ALEKS placement needed, these students place directly into Math 10051.

Select Kent Core Category:

- ☐ **Composition**
- x **Mathematics and Critical Reasoning**
- ☐ **Humanities and Fine Arts**
  - ☐ **Humanities**
  - ☐ **Fine Arts**
- ☐ **Social Sciences**
- ☐ **Basic Sciences**
- ☐ **Additional**

1. **Explain how the course addresses (a) concepts central to the subject area and (b) the specific Kent Core learning goals listed in the *University Catalog* (www.kent.edu/catalog/kent-core)**

   a. **Acquire critical thinking and problem-solving skills.**

   In this course students will be asked to examine current issues such as medical testing, students will then have to make decisions on whether or not to pursue further testing based on the information reported.

   b. **Apply principles of effective written and oral communications.**

   On a daily basis students will be completing activities where they must communicate their ideas orally then in writing for submission to be graded.

   c. **Broaden their imagination and develop their creativity.**

   Students will be investigating topics currently in the news such as global warming. Through class discussions students will have opportunities to think of creative ways in which they can impact the environment and reasons why their actions can be significant.

   d. **Cultivate their natural curiosity and begin a lifelong pursuit of knowledge.**

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Students will be investigating topics currently in the news such as the garbage problem in the Pacific Ocean a as a result of the Tsunami in Thailand in 2004. This will engage students to think about topics they may have not considered as containing any mathematical importance.

e. **Develop competencies and values vital to responsible uses of information and technology.**

Students will create many different type of graphs with technology and explain the differences and strengths of each different representation.

f. **Engage in independent thinking, develop their own voice and vision and become informed, responsible citizens.**

The materials used for this course were developed using topics from current events, such as social, health, or environmental issues where students explore/read through an article and are asked to evaluate and critique using numerical reasoning, not just stating an opinion.

g. **Improve their understanding of issues and behaviors concerning inclusion, community and tolerance.**

Since students will be working in randomly assigned groups giving them opportunities to interact with students with differing backgrounds and interests.

h. **Increase their awareness of ethical implications of their own and others' actions.**

Through class discussion and working together in small groups students will be gain insight as to how their reactions or lack of can impact others.

i. **Integrate their major studies into the broader context of a liberal education.**

Students will on a weekly basis bring in articles of interest to them and discuss the relevant quantitative information contained in the news clipping or graphic display.

j. **Strengthen quantitative reasoning skills.**

A major goal of this course is to develop the intellectual skills needed to deal with quantitative information as a citizen and in the workplace. On a daily basis students will interact with the course materials beyond the typical skill and drill typically encountered in a lower level mathematics course making decsions that can be supported with numerical reasoning.

k. **Understand basic concepts of the academic disciplines.**

Students will have the opportunity to use a variety of mathematical strategies, breaking difficult questions into component parts, and looking at questions from various viewpoints in diverse settings

2. **If this course is being proposed for the Composition category or the Mathematics and Critical Reasoning category, indicate the essential skills that the course is intended to teach, sharpen or strengthen. (Skip this question if the proposed course is intended for other categories.)**

   Engage students in a meaningful intellectual experience, increase students' quantitative and logical reasoning abilities, improve students' ability to communicate quantitative ideas, and strengthen mathematical abilities that students need in other disciplines.

3. **State how the course is representative of a field that has attained maturity and substance with critical mass of its own scholarly literature, methodology, community of specialists and conceptual framework.**

   This course will reflect the Mathematical Association of America's Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004. An updated version of the CUPM Curriculum Guide was released in 2015. In this document six core Quantitative Reasoning outcomes were referenced. The State of Ohio has included these outcomes in TMM011.

4. **Are adequate resources available for this course (e.g., faculty, classroom space, equipment, library holdings)? If yes, explain.**

   The new classrooms developed in the redesigned space of the former Math Emporium in the second floor of the library. Students will access to computers and be sitting at round table to promote collaborative learning.

5. **Has this course been offered previously?**

   NO

6. **Given the available Kent Core course options, why is it important that this course be added as an option for students in fulfilling their Kent Core?**

   This course is a transfer module course and provides an alternate pathway for students whose major does not require algebra.

7. **Please complete and attach the Kent Core Learning Outcomes Assessment Plan, and attach a sample syllabus.**

   Attached

Rational for Creating Math 10051, Quantitative Reasoning

Rather than continuing to place all students in traditional mathematics pathways there is a movement to match the right mathematics course to different majors. Students in many programs of study can be suitably prepared with alternative gateway math courses in quantitative reasoning. By offering alternate pathways in mathematics students are likely to have good outcomes. Ohio's new TMM011 learning outcomes expectations provide an ideal impetus to launch radical changes to freshman mathematics, raise awareness and appreciation of the pervasive value of mathematical thinking, and to significantly improve student success at college and beyond.

The first pilot implementation will be through paired Writing and Quantitative Reasoning sections in Spring 2017. Working with a grant received from The Ohio Mathematics Bridges to Success initiative, students will work in groups on mathematical concepts that require sustained thinking then learn how to communicate the solution process and interpret results in a sustained piece of writing. Both courses emphasize critical thinking and communication with a common goal to develop student's ability to identify real life situations where mathematical approaches can be successfully communicated to a relevant audience. This approach requires effective connection and collaboration between faculty, advisors and administrators to build new systems that enhance student success.

Students will be recruited according to placement scores along the "bubble." This means students with ACT scores 18 – 21 or an SAT sub score of 400 – 500 and ALEKS placement scores of 30% of higher will be targeted. These students have the most to gain. It is felt that reaching out to freshman in their first or second semester has the highest probability of making an impact of retention and future graduation.

The primary student population of a Quantitative Reasoning course is typically students seeking a Bachelor's of Arts degree requiring a liberal arts mathematics course. Our new Quantitative Reasoning course will target this population and emphasize core mathematical general education outcomes while increasing students' logical reasoning abilities ~~ability~~ to communicate quantitative ideas, and strengthen mathematical abilities that students will need in other disciplines.

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SYLLABUS

MATH 10051– Quantitative Reasoning (4 Credit Hours)

Catalog Information: In the broadest sense mathematics should provide students the needed quantitative tools, logical reasoning and problem solving skills, and a sense that quantitative modeling can be used to describe and understand developments in many areas of daily living. Since critical thinking is the primary objective and outcome for our course, in each area of concentration (numeracy, mathematical modeling, and probability and statistics) students will need to read and glean information from the problem situation, convert the information into a usable form, perform any needed routine calculations, make or draw a conclusion, and then communicate the result via explanation using numerical reasoning by writing coherent statements and paragraphs

Prerequisite: For majors not needing Algebra and have an ACT score lower than 21 or an SAT score lower than 510; Successful completion of Math 10022 or ALEKS placement score of 35% of higher. **For majors not needing Algebra and have an ACT score 22 or higher and an SAT score of 520 or higher;** No ALEKS placement needed, these students place directly into Math 10051.

Insert Kent Core statement

Course Materials: Quantway II, a program of the Carnegie Foundation for the Advancement of Teaching, Carnegie Math Pathways project

Numeracy (7 days)

- Interpret different uses of %, % of whole - % change
- Solve percentage problems
- Apply proportional (using ratios and proportions) reasoning skills to compare and contrast
- Understand the difference between absolute change and relative change
- Dimensional analysis
- Index numbers: use and calculate indexes to understand and compare data
- Understand budget basics
- Understand how the CPI is used to measure inflation

Mathematical Modeling (11 days)

General function knowledge

- Understand functional notation, domain, and range
- Construct and interpret graphs including piecewise functions
- Recognize linear and non-linear functions from formulas, graphs, and/or tables

Linear Functions

- Recognize when a linear function can be used for modeling real-world data and find the equation that represents this relationship.

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- Find an equation for the regression curve and use this equation to predict values of the dependent variable for given values of the independent variable
- Write linear function to model real-world situations
- Apply and interpret linear models to make decisions

Exponential/log functions

- Understand the how to recognize the difference between linear and exponential growth or decay
- Determine when a data set is growing or decreasing at an exponential rate
- Understand the difference between rate of change and percent change
- Analyze relevant formulas to compute simple and compound interest
- Understand ordinary annuities and how to use the accumulated savings formula
- Apply loan payment formula to understand and analyze credit card debt and installment loans
- Find an equation for the regression curve and use this equation to predict values of the dependent variable for given values of the independent variable
- Write exponential function given:
  - Two solutions, parameters, or one parameter and one solution
  - Apply and interpret in application problems parameters and find specific solution given one variable
- Understand the inverse relationship between exponential on logarithmic functions and its usefulness and use this solve exponential equations
- Understand why Logarithms are used for handling very large/small numbers (pH, earthquake magnitudes, sound levels, etc.)

Basic Probability and Statistics (8 days)

- Distinguish between quantitative and qualitative data
- Draw bar graphs, circle graphs, histograms and be able to interpret them in the context of the data they represent
- Decide what or when each type of graphical display is appropriate for the type of data and describe their strength, limitations and possible deceptions
- Distinguish the difference between surveys, experiments, and case control studies
- Justify statistical decisions
- Compute and compare mean, median, mode and appropriate uses for each
- Compute and use the appropriate measure of center to analyze and compare data sets
  - 5 number summary: construct and interpret a box plot for contextual situations
  - Standard deviation: Use the 68-95-99.7 rule to interpret probabilities
- Calculate probabilities and conditional probabilities and use them to make informed decisions
- Interpret the accuracy of medical testing

EXAMS (4 days)

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Kent Core Learning Outcomes Assessment Plan

Math 10051: Quantitative Reasoning (4 credits)
Department/School: Mathematics

Proposed Kent Core Category: ☐ Composition ☐ Humanities and Fine Arts ☐ Social Sciences
(please check appropriate box) x Mathematics and Critical Reasoning ☐ Humanities ☐ Basic Sciences
☐ Fine Arts ☐ Additional

The successful Quantitative Reasoning student can:

I. Kent Core Learning Outcome	II. State TMM011 and III. Course Learning Outcome	IV. What method(s) will be used to assess student learning?	V. What evidence of this assessment will be presented annually for the five-year Kent Core review of this course?
Acquire critical thinking and problem-solving skills. Understand basic concepts of the academic discipline. Strengthen quantitative reasoning skills.	**1. Numeracy:** The successful Quantitative Reasoning student should be able to demonstrate these competencies: 1.1 Solve real-world problems requiring the use and interpretation of ratios in a variety of contexts: Parts to whole comparisons, converting decimals to percentages and vice versa, quantifying risks by calculating and interpreting probabilities, rates of change, and margins of error.	Daily classroom activities, quizzes, news of the day	Final exams, course grades, project
Understand basic concepts of the academic discipline.	1.2 Solve real-world problems relating to rates of change, distinguishing between and utilizing models that describe absolute change and relative change including growth and decay.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Acquire critical thinking and problem-solving skills.	1.3 Compare and contrast statements which are proportional and those that are not by applying	Daily classroom activities, quizzes,	Final exams, course grades

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Understand basic concepts of the academic discipline. Strengthen quantitative reasoning skills.	proportional reasoning appropriately to real-world situations such as scaling, dimensional analysis and modeling.	news of the day	
Apply principles of effective written and oral communications. Engage in independent thinking, develop their own voice and become informed, responsible citizens	1.4 Demonstrate numerical reasoning orally and/or by writing coherent statements and paragraphs.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Acquire critical thinking and problem-solving skills. Strengthen quantitative reasoning skills. Apply principles of effective written and oral communications. Broaden their imagination and develop their creativity.	**2. Mathematics Modeling:** The successful Quantitative Reasoning student should be able to demonstrate these competencies: 2.1 Create and use tables, graphs, and equations to model real-world situations including: using variables to represent quantities or attributes, estimating solutions to real-world problems using equations with variables, identifying pattern behavior, identifying how changing parameters can affect results, and identifying limitations in proposed models.	Daily classroom activities, quizzes, news of the day	Final exams, course grades, project
Cultivate their natural curiosity and begin a lifelong pursuit of knowledge. Develop competencies and values vital to responsible uses of information and technology	2.2 Model financial applications such as credit card debt, installment savings, loans, etc. and calculate income taxes.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Acquire critical thinking and problem-solving skills.	2.3 Create basic linear and exponential models for real-world problems and be able to choose which one is	Daily classroom activities, quizzes,	Final exams, course grades

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Understand basic concepts of the academic discipline. Strengthen quantitative reasoning skills. Apply principles of effective written and oral communications.	most appropriate for a given context and describe the limitations of the proposed models.	news of the day	
Acquire critical thinking and problem-solving skills. Understand basic concepts of the academic discipline.	2.4 Use basic logarithm properties to address questions (regarding time periods etc.) arising in real-world situations modeled exponentially.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Acquire critical thinking and problem-solving skills. Apply principles of effective written and oral communications.	2.5 Explain and critique models orally and/or by writing coherent statements and paragraphs	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Acquire critical thinking and problem-solving skills. Strengthen quantitative reasoning skills. Cultivate their natural curiosity and begin a lifelong pursuit of knowledge. Increase their awareness of ethical implications of their own and others' actions	**3. Probability and Statistics:** The successful Quantitative Reasoning student should be able to demonstrate these competencies: 3.1 Critically evaluate statistics being presented in the media, journals, and other publications including evaluating the research methodology, critiquing how the author(s) came to their conclusions, identifying sources of bias, and identifying confounding variables. Students will be able to critically evaluate sampling strategy, the impact of sample size, correlation versus causation, and any inferences made.	Daily classroom activities, quizzes, news of the day	Final exams, course grades, project
Acquire critical thinking and problem-solving skills.	3.2 Summarize and interpret datasets with regard to shape, center, and spread. Use both graphical and	Daily classroom activities, quizzes,	Final exams, course grades

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Apply principles of effective written and oral communications.	numerical information. Use statistics appropriate to the shape. Students will be able to compare two or more datasets in light of this type of information.	news of the day	
Develop competencies and values vital to responsible uses of information and technology	3.3 Create visual representations of real-world data sets such as charts, tables, and graphs and be able to describe their strengths, limitations, and deceptiveness.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Understand basic concepts of the academic discipline. Acquire critical thinking and problem-solving skills.	3.4 Calculate probabilities and conditional probabilities in real-world settings, and employ them to draw conclusions.	Daily classroom activities, quizzes, news of the day	Final exams, course grades
Apply principles of effective written and oral communications. Improve their understanding of issues and behaviors concerning inclusion, community and tolerance	3.5 Justify decisions based on basic statistical (probabilistic) modeling orally and/or by writing coherent statements and paragraphs.*	Daily classroom activities, quizzes, news of the day	Final exams, course grades

ASSURANCES:

By submitting this proposal, we assure that:

1. The faculty members who teach this course have agreed to the learning outcomes and assessment methods.
2. Assessment results will be reviewed annually by the faculty and submitted to the University Requirements Curriculum Committee.
3. Modifications to the course and/or assessment plan will be based on the annual review.

AM Tong   11-8-16

Department Chair/School Director (or designee) Signature   Date