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: 11/5/2014

Department/School: Mathematical Sciences

Course ID: 10772 **Credit Hours:** 5

Course Title: Modelling Algebra Plus

Prerequisite(s): (Math ACT score of 22 or higher) or (ALEKS score of 35 or higher) or (C or better in Math 00022).

Select Kent Core Category:

- ☐ **Composition**
- ☒ **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.**

   One primary objective of this course is problem solving.

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

   Students will present written reports of their work.

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

   This course will expand the way students perceive the importance and utility of quantitative reasoning in situations that are of relevance to their future careers. Modelling problems arising from real-world situations will require creative interpretations.

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

   Success and positive experiences in this course will help break down the notion that mathematical sciences are not accessible or useful to the average person in everyday situations. This will lead students to expand the domains where they feel confident to pursue their natural curiosity and develop their knowledge.

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

   Familiarity with number facts is critical for understanding information in the modern

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world.

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

Understanding number facts is often necessary to independently and critically evaluate information that is given a person.

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

Not routinely covered in this course.

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

Not routinely covered in this course.

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

The use of algebra to model various situations arises in a number of contexts.

j. **Strengthen quantitative reasoning skills.**

This is a primary goal of the course.

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

The use of algebra to model various situations arises in a number of contexts.

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.)**

This course is intended for students to learn how to model real world problems mathematically and use algebra to solve those problems.

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.**

Algebra has its roots in antiquity. Algebra as a separate discipline emerged in the 16th century, and has been an object of research and study continuously since then.

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

Yes. Enrollments for Math 00023 and Math 11009 will decline as enrollments for this course increases.

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

Currently being offered as Math 20095.

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?**

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Students taking this course will have the same outcomes as Math 11009 Modeling Algebra and that course fulfills the Kent Core. This course is open to students who are not prepared for Math 11009 and provides the background and extra time such students need to be successful with this material. Students will not be allowed to get credit for this course and for Math 11009. Students that have credit for one of Math 11010, Math 10774, or Math 10775 are not allowed to obtain credit for this course.

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

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Kent Core Learning Outcomes Assessment Plan

Course number, title (credit hours): 10772, Modeling Algebra Plus (5 credit hours)

Department/School: Department of Mathematical Sciences Proposed Kent Core Category: Mathematics and critical reasoning

A sample syllabus must accompany the plan.

I. Kent Core learning objectives	II. Ohio Transfer Module learning objectives	III. What corresponding learning outcomes are included in this course?	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?
Analyze a given set of real-world discrete data numerically and graphically and determine which of the elementary functions would be an appropriate mathematical model.	Develop mathematical thinking and communications skills by incorporating activities that will help all students progress in developing analytical, critical reasoning, problem-solving, and communication skills and acquiring mathematical habits of mind	Use a function model to analyze and interpret a situation described verbally or with data.	Solve problems in class and discuss theorems. Work with a group on projects and lab activities.	Each year, data from all sections will be collected and analyzed. We will report the total number of students assessed, and the achievement levels on homework, midterms and final.
With the aid of a spreadsheet, graphing calculator, or similar technology, students can construct a model that captures essential features of a situation described by discrete data	Approach problem solving with a willingness to try multiple approaches, persist in the face of difficulties, assess the correctness of solutions, explore examples, pose questions, and devise and test conjectures.	Compare and contrast characteristics (numeric, graphical, symbolic) of functions studied in the course: linear, quadratic, exponential, logarithmic, polynomial	Complete homeworks, lab write-ups, and group projects; pass midterm tests and a final exam.	

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I. Kent Core learning objectives	II. Ohio Transfer Module learning objectives	III. What corresponding learning outcomes are included in this course?	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?
Analyze the algebraic structure and graph of a function, including those listed above to determine intercepts, domain, range, intervals on which the function is increasing, decreasing or constant, the vertex of a quadratic function, asymptotes, whether the function is one-to-one, whether the graph has symmetry (even/odd), etc., and given the graph of a function to determine possible algebraic definition.	Approach problem solving with a willingness to try multiple approaches, persist in the face of difficulties, assess the correctness of solutions, explore examples, pose questions, and devise and test conjectures.	Compare and contrast characteristics (numeric, graphical, symbolic) of functions studied in the course: linear, quadratic, exponential, logarithmic, polynomial.	Complete homeworks, lab write-ups, and group projects; pass midterm tests and a final exam.	
Solve many different problems related to the following functions: linear, quadratic, polynomial, exponential, rational, and logarithmic.	Read mathematics with understanding and communicate mathematical ideas with clarity and coherence through writing and speaking.	Master algebraic techniques and manipulations necessary for problem solving and modeling in this course	All activities in the course contribute to basic proficiency in quantitative reasoning.	

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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.

Department Chair/School Director (or designee) Signature ______________ Date 11-20-14

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SYLLABUS
Math 10772-Modeling Algebra Plus
(5 Credit Hours)

Text: Harshbarger & Yocco (2013). *College Algebra in Context with applications for the managerial, life, and social sciences,* 4^{th} edition. New York: Addison Wesley

Review and Extension of Basic Skills (18 days)
- Medium level factoring techniques
    - Grouping
    - Special binomial forms
    - Quadratic from

- Equations and inequalities from function point of view –
  (Rule of Four- graphing, numerical, verbal, symbolic)
    - Quadratics, including Quadratic Formula and completing the square

- Problem solving

Rational Expressions and Functions (9 days)
- Simplify expressions
- Multiply and divide expressions
- Add and subtract expressions
- Rational equations
- Rational functions
    - Basic graphs
    - Domains
    - Modeling

General Properties of Functions (6 days)
- Real world scenarios focusing on interdependence between two variable quantities
- Increasing/decreasing
- Inputs/outputs; domain/range
- Interpreting and creating graphs
- Function notation
- Operations on functions
    - Addition, subtraction, multiplication
        - Graphical, numerical, symbolic

Linear Models (6 days)
- Slope in context: students can recognize in a data set or real world scenario when linear model is appropriate
- Review writing equations for lines – in context
- Piecewise linear functions:
    - Writing models
    - Sketching graphs

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Systems of Linear Equations (6 days)

- Systems of two equations in context
    - Writing models
    - Review algebraic solution
- Systems of three or four equations

Exponential and Logarithmic Models (15 days)

- Writing exponential models
    - Recognizing exponential vs. linear – in data tables and real world scenarios
    - Arbitrary bases
    - Base *e*
- Graphs of exponential functions
- Orders of magnitude as introduction to logarithms
- Modeling with logarithms: Richter scale and decibels
- Skills:
    - Evaluate logarithms using the definitions
    - Convert exponential equations to equivalent logarithmic equations and vice versa
    - Properties of logarithms
    - Solve exponential equations using logarithms
    - Solve logarithmic equations
- Graphs of logarithmic functions
- Inverse functions in context
    - relation between exponential and logarithmic functions
- Composition of functions

Polynomial Models (7 days)

- Quadratic functions in context
    - Review solutions by hand
        - zeros, maximum, minimum values
- Cubics and quartics
    - Regression equations on a calculator
- Polynomial division, synthetic division, Factor Theorem, finding real zeros

5 EXAMS 3 REVIEW DAYS

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KENT STATE UNIVERSITY

Name: Katherine J Smith

Submission Date: 1/19/2015

Organization: Curriculum Services

Course Catalog Update

<< Go back to Course Catalog Update form

Print

Basic Course Data

Change type: Establish

Faculty member submitting this proposal: Mark L. Lewis

Requested Effective Term: 201580

Campus: Kent

College: AS-Arts and Sciences

Department: MATH-Mathematical Sciences

Course Subject: MATH-Mathematics

Course Number: 10772

Course Title: Modeling Algebra Plus

Title Abbreviation: Modeling Algebra Plus

Slash Course and Cross-list Information:

Credit Hours

Minimum Credit/Maximum Credit: 5 to 5

Contact Hours: Lecture - Minimum Hours/Maximum Hours: 5 to 5

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): Study of algebra arising in the context of real-world applications, including linear, polynomial, exponential and logarithmic models. Includes a review of factoring and functions. Intended for students not planning to take calculus. No graduation credit for this course for students who have already passed MATH 11010. Students cannot get credit for both this course and Math 11009. This course has the same outcomes as MATH 11009. This course is intended for students who score 22 or higher on ACT Math, but do not have an ALEKS score of 45 or higher. The course will fulfill the any requirement for Math 11009.

Prerequisites (edited): (Math ACT score of 22 or higher) or (ALEKS score of 35 or higher) or (C or better in Math 00022).

Corequisites (edited):

Registration is by special approval only: No

Content Information

Content Outline:

Content Hours per Course Topic	Topic Description
18	Review and Extension of Basic Skills

9	Rational Expressions and Functions
6	General Properties of Functions
6	Linear Models
6	Systems of Linear Equations
15	Exponential and Logarithmic Models
7	Polynomial Models
5	Exams
3	Review

Display/Hide Delimited Course Outline

Total Contact Hours: 75

Textbook(s) used in this course: Harshbarger & Yocco (2013). College Algebra in Context with applications for the managerial, life, and social sciences, 4th edition. New York: Addison Wesley

Writing Expectations: Students will expect to write homework and exams.

Instructor(s) expected to teach: Mulqueeny, Sharp

Instructor(s) contributing to content: Tonge, Reed, Mulqueeny

Proposal Summary

Explain the purpose for this proposal:

State regulations do not allow students scoring 22 or higher on Math ACT to be placed in "remedial" courses. On the other hand, our data indicates that that students scoring below 45 on ALEKS are not successful in Math 11009. This course will cover the topices needed so such students can be successful. This course should have the same outcomes as Math 11009.

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

NA

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

Students currently placed in Math 00023 and needing Math 11009 would be placed in this course.

Explain how this proposal affects enrollment and staffing:

This course will lower the enrollments in Math 00023 and Math 11009. Instructors currently teaching those courses will be diverted to this course. Should have no net impact on staffing.

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

All Colleges

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: (~ * / \ --)

Approve | Return To Previous Approver | Deny

Comments:

Date	User	Comment
11/13/2014	Mark L. Lewis	No comments available.

History:

Date	User	Status
12/15/2014	Donald F. Palmer	Approved
12/8/2014	Mary Ann Haley	Approved
11/20/2014	Andrew M. Tonge	Approved
11/13/2014	Mark L. Lewis	Submitted
11/4/2014	Andrew M. Tonge	Returned For Edit
11/3/2014	Mark L. Lewis	Submitted