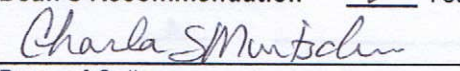# WINONA STATE UNIVERSITY
NEW AND REVISED COURSE AND PROGRAM APPROVAL FORM

Routing form for new and revised courses and programs.   Course or Program **MATH 117, Precalculus with Modeling**

Department Recommendation ___✓___ Yes   _____ No*

(See the attached minutes from the department meeting at which this course proposal was approved.)

_____   2/12/14   bdeppa @ winona.edu
Department Chair   Date   e-mail address

Dean's Recommendation ___✓___ Yes   _____ No*

Charla S Mintzalan   2/12/14
Dean of College   Date

*The dean shall forward their recommendation to the chair of the department, the chair of A2C2, and the Vice President for Academic Affairs.

A2C2 Recommendation _____ Approved   _____ Disapproved

_____   _____
Chair of A2C2   Date

Graduate Council Recommendation _____ Approved   _____ Disapproved
(if applicable)

_____   _____
Chair of Graduate Council   Date

_____   _____
Director of Graduate Studies   Date

Faculty Senate Recommendation _____ Approved   _____ Disapproved

_____   _____
President of Faculty Senate   Date

Academic Vice President Recommendation _____ Approved   _____ Disapproved

_____   _____
Academic Vice President   Date

Decision of President _____ Approved   _____ Disapproved

_____   _____
President   Date

Please forward to Registrar.

Registrar _____   Please notify department chair via e-mail that curricular change has been recorded.
               Date entered

1

S 2/13/14

WINONA STATE UNIVERSITY
PROPOSAL FOR A NEW COURSE

This form is to be used to submit a proposal for a new undergraduate or graduate course. Every item on this form must be completed prior to submission to A2C2. The department proposing a new course must include a *Financial and Staffing Data Sheet* and a *New and Revised Course and Program Approval Form* with the department chairperson's and Dean's signatures. Refer to Regulation 3-4, *Policy for Changing the Curriculum*, for complete information on submitting proposals for curricular changes.

Department __**Mathematics and Statistics**_____ Date ___**1/24/14**_____

_**MATH 117**_____   **Precalculus with Modeling**_____   __**4**__

Course No.   Course Title   Credits*

This proposal is for a(n): __**X**____ Undergraduate Course   _____ Graduate Course

Is this course for USP? ____Yes** _**X**__ No   Is this course for GEP? _**X**_Yes** ____ No

List all Major Codes to which this proposal applies as a required course: **None currently**

List all Major Codes to which this proposal applies as an elective course: **None currently**

List all Minor Codes to which this proposal applies as a required course: **None currently**

List all Minor Codes to which this proposal applies as an elective course: **None currently**

Prerequisites   _**Qualifying score on the mathematics placement exam, or MATH 050**__

Grading method _____ Grade only   _____ P/NC only   ___**X**__ Grade and P/NC Option

Frequency of offering _**Every semester**_____

What semester do you anticipate that will this course be offered for the first time? ____**Fall 2014**_____
Note: The approval process for a new course typically takes at least four to six weeks

* If this course will change the number of credits for any major or minor, the form *Proposal for a Revised Program* must also be submitted and approved according to the instructions on that form.

**For General Education Program (GEP) or University Studies (USP) course approval, the form *Proposal for General Education Courses* or *Proposal for University Studies Courses* must also be completed and submitted according to the instructions on that form.

Please provide all of the following information:
(Note: a syllabus or other documentation may not substitute for this)

   A. Course Description

   1. Description of the course as it will appear in the WSU catalog, including the credit hours, any prerequisites, and the grading method.
      If the course can be repeated, indicate the maximum number of credit hours for which this can be done.

   Credits: 4
   Prerequisites: Qualifying score on the mathematics placement exam, or MATH 050
   Grading method: Grade and P/NC option

   A precalculus course with primary emphasis on introductory mathematical modeling. Topics include modeling using linear and polynomial functions, exponential growth and decay scenarios, logarithmic relationships, sinusoidal functions, and difference equations. In addition, the course includes analysis of these modeling methods. Applications will include population, and physiological models. Meets GOAL 4. Prerequisite: Qualifying score on the math placement exam, or MATH 050 **Meets GOAL 4 – Mathematical/Logical Reasoning.**

2. Course outline of the major topics, themes, subtopics, etc., to be covered in the course. This outline should be, at a minimum, a two-level outline, i.e., consisting of topics and subtopics. This information will be submitted to MnSCU by the WSU Registrar's office.

A. Introduction to Modeling
1. Empirical vs. theoretical models
2. Goals, assumptions, and limitations of models
3. Unit analysis

B. Review Topics
1. Natural numbers, whole numbers, integers, rational numbers, irrational numbers
2. Formal rules of algebra, exponents, radicals, polynomials, factoring,
3. Inequalities, absolute value

C. Functions
1. The idea of a function
2. One-to-one functions and their inverses
3. Transformations of functions, combining functions, composition of functions

D. Polynomial and rational functions
1. Basic properties of linear, polynomial, and rational functions
2. Modeling with polynomial functions

E. Validating models
A. Dealing with measurement error
B. Accept, improve, or reject a model?

F. Exponential and logarithmic Functions
1. Basic properties of exponential and logarithmic functions
2. Modeling with exponential and logarithmic functions

G. Trigonometric Functions
1. Unit circle, angle measure, radian measure
2. Trig functions of real numbers, trig functions of angle measure
3. Graphs of all trig functions with transformations of amplitude, phase shift, vertical   shift, and time period
4. Modeling with trigonometric functions

H. More Advanced Modeling
1. Modeling with difference equations
2. Modeling with differential equations using Euler's Method
3. Modeling with discrete-time Markov chains
4. Modeling dynamical systems

Distribution of Time in the Course: A substantial portion of time will be spent on, and a significant part of the student's final grade will depend on, modeling important real-world phenomena. Students will be required to solve realistic problems using technology.

Method of Instruction: Lecture-presentation, discussion, question-answer sessions, use of calculators/computers, group work.

Evaluation Procedure: Homework, quizzes, projects, midterm exams, and a final exam.

3.a   Instructional delivery methods utilized: (Please check all that apply).

Auditorium/Classroom: X	ITV	Online	Web Enhanced	Web Supplemented: X
Laboratory:	Service Learning	Travel Study	Internship/Practicum	
Other: (Please indicate)				

3.b. MnSCU Course media codes: (Please check all that apply).

None:	3. Internet	6. Independent Study	9. Web Enhanced
1. Satellite	4. ITV Sending	7. Taped	10. **Web Supplemented: X**
2. CD Rom	5. Broadcast TV	8. ITV Receiving	

4. Course requirements (papers, lab work, projects, etc.) and means of evaluation.
   Requirements: Active class participation and completion of in-class activities, case studies, homework problems, quizzes, midterm exams, and a final exam, as required by the instructor.

   Evaluation: Students will be assessed on their class participation, and their performance on in-class activities, case studies, homework problems, quizzes, midterm exams, and a final exam, as set by the instructor.

5. Course materials (textbook(s), articles, etc.).
   Possible Textbooks
   Functions Modeling Change, current edition by Deborah Hughes-Hallett, *et al.*
   Contemporary Precalculus through Applications: Functions, Data Analysis, and Matrices, current edition, by Gloria Barrett *et al.*
   Functioning in the Real World: A Precalculus Experience, current edition, by Sheldon P. Gordon *et al.*
   Precalculus: A View of the World around Us, current edition, by David Wells and Lynn Tilson

   Additional Resources
   Biomath: Problem Solving for Biology Students, current edition, by Robert W. Keck and Richard R. Patterson
   Earth Algebra: College Algebra with Applications to Environmental Issues, current edition, by Christopher Schaufele, *et al.*

6. List the student learning outcomes for this course and how each outcome will be assessed.

Learning Outcome (A successful student will…)	Assessment Method
Formulate mathematical models to describe physical situations	**Homework Assignments** **Case Studies** **Quizzes and Exams**
Generate and analyze appropriate graphs, sample data, and/or numerical calculations	**Homework Assignments** **Case Studies** **Quizzes and Exams**
Use technology as appropriate to understand models and to analyze data collected to validate them	**Homework Assignments** **Case Studies** **Quizzes and Exams**
Draw appropriate conclusions about from models, and clearly express, and defend, those conclusions	**Homework Assignments** **Case Studies** **Quizzes and Exams**

B. Rationale
Provide a rationale for the new course. The rationale should include the following items.

1. A statement of the major focus of the course.
   The standard course on precalculus focuses on algebraic and symbolic manipulations, and graphing, and does not serve as a useful terminal course. MATH 117 will focus on applying precalculus-level mathematics to modeling real-world phenomena, and will serve as good terminal course as well as preparation for a modeling course at the calculus level, which we may want to offer in the future.

2. A statement of how this course will contribute to the departmental curriculum.
   Currently at WSU, a student must work through at least four MATH courses to take a course on modeling, even though many models can be understood, and used intelligently, with much less preparation. This course will introduce students to the unique perspective given by mathematical models, with only minimal prerequisites.

3. A statement of why this course is to be offered at this level (i.e. 100-, 200-, 300-, 400-, or 500-level)
   This is a general education course, and is intended for students from all majors/backgrounds.

4. Identification of any courses which may be dropped, if any, if this course is implemented.
   No courses will be dropped. We anticipate that the students who enroll in MATH 117 will be drawn from those who are currently taking MATH 120 or, possibly, MATH 112.

C. Impact of This Course on Other Departments, Programs, Majors, and Minors
   1. Provide a statement of the impact of this course on other departments, programs, majors, and minors. Clearly state the impact of this course on courses taught in other departments. Does this course duplicate the content of any other course? Is there any effect on prerequisites for this or any other courses?
   We have attached a letter from Dr. Brian Zeller, chair of the HERS Department expressing support for this course. These majors will represent the largest cohort of students positively affected by MATH 117. We anticipate there may be others, as well. So far as we can tell, no program or group of students will be negatively affected because we will continue to offer multiple sections of MATH 120, the standard precalculus course, every year.

   2. Would approval of this course change the total number of credits required by any major or minor of any department? If so, explain the effects which this course would have.
   No. Currently HERS requires MATH 120, which is 4 credits; they will be replacing this with MATH 117, another four-credit course. Ditto for all other programs that currently require or recommend or advise students into MATH 120.

   3. If this course has an impact on the major or minor of any other department or program, it is the responsibility of the department submitting the course proposal to send written notification to the department(s) or program(s) affected. State clearly which other programs are affected by this proposal and whether the other departments have been notified and/or consulted. Attach letter(s) of understanding from impacted department(s).
   As indicated above, the only program that we know of that will be affected has already been notified and supports this change.

   D. Attach to This Proposal a Completed
      1. *Financial and Staffing Data Sheet*
      2. *New and Revised Course and Program Approval Form*

E. Department Contact Person for this Proposal:

<u> **Jeff Draskoci-Johnson** </u>   <u> **457-2989** </u>   <u> **jdraskocijohnson@winona.edu** </u>
   Name (please print)   Phone   e-mail address

F. Review by Department A2C2 Representative

I have reviewed this proposal and certify that it is complete _____
                                                                Signature of A2C2 representative

Definitions for codes in 3a and 3b:
01-Satellite:
02- CD ROM:
03- Internet: Predominately = where all, or nearly all, course activity occurs in an online environment. One to two activities may occur face-to-face in a classroom, with the maximum being two activities.
04 – ITV Sending: a course in which students are in the classroom with the instructor, other students join via interactive television technology from other geographically separate locations
05 – Broadcast TV:
06 – Independent Study: a course in which the teacher develops specialized curriculum for the student(s) based on department guidelines in the University course catalog
07 – Taped: a course in which the teacher records the lessons for playback at a later date
08 – ITV Receiving: a course in which students are not in the classroom with the teacher, other students join via interactive television technology from other geographically separate locations
09 – Web Enhanced- Limited Seat Time: For a course in which students are geographically separate from the teacher and other students for a majority of required activities. However, some on-site attendance is required. The course includes synchronous and/or asynchronous instruction.
10 – Web Supplemented- No Reduced Seat Time: For a course utilizing the web for instructional activities. Use of this code may assist your college/university in tracking courses for "smart classrooms" and/or facility usage.

WINONA STATE UNIVERSITY
FINANCIAL AND STAFFING DATA SHEET

Course or Program__**MATH 117 – Precalculus with Modeling**__

Include a Financial and Staffing Data Sheet with any proposal for a new course, new program, or revised program.

Please answer the following questions completely. Provide supporting data.

1. Would this course or program be taught with existing staff or with new or additional staff? If this course would be taught by adjunct faculty, include a rationale.
   This course would be taught with existing staff. We anticipate that students who enroll in MATH 117 will be among those who are currently enrolling in MATH 120. Hence, total enrollment across precalculus-level courses should not change.
   The HERS Department projects a continuing average of about 55 majors per year who will be required to take either MATH 117 or MATH 120, and strongly advised to take the former. Majors under previous versions of the catalog will be strongly advised to take MATH 117 instead of MATH 120.
   We anticipate that we can still accommodate all students without lowering overall average enrollment simply by offering one fewer section of MATH 120 every semester. We will be coordinating with HERS on a continuing basis to ensure MATH 117 is offered at a time that is as convenient as possible for their majors.

2. What impact would approval of this course/program have on current course offerings? Please discuss number of sections of current offerings, dropping of courses, etc.
   See the answer to the previous question. We will be offering one fewer section of MATH 120 per semester.

3. What effect would approval of this course/program have on the department supplies? Include data to support expenditures for staffing, equipment, supplies, instructional resources, etc.
   We do not anticipate any effect on departmental supplies.

[Revised 9-05]

WINONA
STATE UNIVERSITY

February 6, 2014

Brant Deppa, PhD
Chair – Department of Mathematics & Statistics

Dr. Deppa,

Over the past few months discussion between the Math & Stats Department and our Movement Science faculty has occurred around the potential of creating a new Precalculus course that would be more specific to students who are entering a professional health science field. The proposed MATH 117 – Precalculus with Modeling (4 cr.), would be an excellent match for students in this major. Once this course was approved and offered, the HERS Department would make the necessary changes in the major so that students would be allowed to take MATH 117 or MATH 120 to satisfy the Precalculs requirement of this major. In reality, if the course is implemented with the design that has currently being discussed, faculty would strongly recommend MATH 117 for fulfillment of the major requirement.

Currently, the Movement Science major has approximately 190 declared students. Approximately 110 of these would be freshman and sophomore level students. The declared students need to take Precalculus sometime in their freshman and sophomore year. Therefore, we would estimate that students within our Movement Science major would require approximately 55-60 seats/year of MATH 117.

Please contact me if you require more information or have questions. Thank you for your time and good luck in your course proposal process.

Sincerely,

Brian Zeller, PhD, ATC
Professor and Department Chair
Interim Director of Athletic Training Education
Winona State University
CAATE Accredited Athletic Training Program
(507) 457-5575
bzeller@winona.edu