

## MATH 142 General Education Proposal

1. A sample syllabus for this course. See attached

2. Statement of how your course meets the Colonnade Plan's learning objectives.

**Course Description:** MATH 142: Calculus for the Life Sciences (5 hours) meets the five learning objectives included in the Quantitative Reasoning section of the Colonnade Plan. Math 142 is a course in one variable calculus including topics from analytic geometry. Students will study exponential and logarithmic functions, derivatives, integrations, first order differential equations, and systems of linear equations, with major emphasis on applications in life sciences. Students will be able to use mathematical principles or theories to solve practical problems. Further, students will learn to model and solve problems appropriate for the field of study in majors of the sciences. Students with a Math ACT of 26 or higher will receive 3 hours credit for this requirement.

MATH 142 specifically meets the five learning objectives as detailed below:

### **Learning Objective 1: Interpret information presented in mathematical forms.**

Students in MATH 142 learn to interpret information presented in mathematical form by first learning to recognize the presence of mathematical information such as functions, including trigonometric functions, equations, graphs or descriptive text.

More specifically, students in Math 142 will learn to:

- evaluate limits analytically
- determine infinite limits and asymptotes
- use mathematical notation to describe carbon dioxide concentrations, heart rates, regression of data

### **Learning Objective 2: Illustrate and communicate mathematical information symbolically, visually and/or numerically.**

Students in MATH 142 learn to illustrate and communicate mathematical information symbolically by learning when and how to use a mathematical expression, equation or function to express quantitative information.

More specifically, students in Math 142 will be able to:

- illustrate and communicate mathematical information visually by learning when and how to use a graph, figure or diagram to express quantitative information
- change mathematical expressions to the appropriate symbols so that they can communicate this information in such problems as heart rates, study time graphs, body fluids, and weight
- properties of derivatives and antiderivatives and appropriate uses in a variety of functions

**Learning Objective 3: Determine when computations are needed and execute the appropriate computations.**

Students in MATH 142 learn to determine when computations are needed and execute the appropriate computations through exercises that develop skills in carrying out procedures accurately and efficiently to solve problems.

More specifically, students in Math 142 will learn through the use of homework to:

- to compute limits
- to compute derivatives through a variety of differentiation rules
- to compute heart rates
- to approximate a zero of a function using Newton's Method, and integrals
- to evaluate indefinite integrals using extensive integration rules
- analyze functions and their graphs for such notions as concavity, points of inflection, relative and absolute extrema, increasing and decreasing, and asymptotes.

**Learning Objective 4: Apply an appropriate model to the problem to be solved.**

Students in MATH 142 learn to apply an appropriate model to the problem to be solved via exercises designed to teach recognition of limits, continuity, derivatives, and differentiation. Appropriately models of a given problem and to develop skill in performing such applications.

More specifically, students in Math 142 will be able to apply:

- appropriate models of derivatives
- appropriate model of integrals
- appropriate models of limits

- appropriate models for related rates
- appropriate models for growth
- models using exponential functions to find growth and decay
- appropriate models for finding heart rates
- approximation techniques to solve a variety of problems

**Learning Objective 5: Make inferences, evaluate assumptions, and assess limitations in estimation modeling.**

Students in MATH 142 learn to make inferences, evaluate assumptions and assess limitations in estimation modeling via application exercises from finance, business, medicine and biology which require imposing “real-world” assumptions and/or limitations on procedures selected and inferences made from results.

More specifically, students in Math 142 will learn to:

- use and approximate the modeling of error analysis in a variety of functions
  - apply theorems correctly as a part of hypothesis testing.

**Brief description of how your department will assess this course’s effectiveness.**

For MATH 142, assessment will occur at the end of the semester. To assess the course objectives, each student will complete a problem that addresses the five learning objectives. A committee of at least three faculty members will select a sample and evaluate the common assessment problem that addresses the skills and concepts as stated in the learning outcomes. The committee will randomly collect 25% to 30% of the sample across all sections of MATH 142 to help assess students’ mastery of the learning outcomes. The following criterion will be used to assess student learning outcomes:

Each test question will be scored on scale of 0 to 5, using a scoring guide developed by the committee in conjunction with the department. A common rubric (5 -Excellent ; 4 - Good; 3 - Satisfactory; 2 - Poor; 0 and 1- Fail).

The goals will be as follows:

Satisfactory = at least 70% of students scored 3 or better

Unsatisfactory = under 70% of students scored 3 or better

- **If necessary, a list of any proposed revisions needed to bring your course in line with the Colonnade Plan.**

MATH 142 will be re-evaluated at the end of each academic year to determine if the learning objectives are being met, and will be updated accordingly.

## Sample Syllabus

### **Math 142 – Calculus with Applications for Life Sciences-**

**Instructor:**

**Class Times:**

**Meeting Place:**

**Class Materials and Grade Information:** Some class materials will be posted in blackboard (<http://ecourses.wku.edu/>).

**Textbook:** Calculus for the Life Sciences, Marvin Bittinger, Neal Brand, John Quintanilla, Dec 2005, Hardback, 780 pages. Publisher: Addison Wesley.

**Prerequisites:** Four years of high school mathematics, including Algebra I and II, Geometry, and a course that includes trigonometry, and satisfactory Math ACT and math placement scores; or MATH 118 or MATH 117 with a grade of C or better.

**Course Description:** Students will study exponential and logarithmic functions, derivatives, integrations, first order differential equations, and systems of linear equations, with major emphasis on applications in life sciences. Students will be able to use mathematical principles or theories to solve practical problems.

**Attendance:** Students are expected to attend every class as scheduled. It is your responsibility to obtain any missed work. Be aware that your punctual attendance is very essential for your success in this course. Students having more than three **unexcused** absences will receive "F".

**Homework and Quiz:** Suggested homework questions will be released in each week, but will NOT be collected. On every Thursday except exam weeks, there will be a short quiz in the beginning of the class (close book, close notes), and the questions will be similar to homework problems and examples in the lectures.

**Tests:** There will be three in-class tests, each of which is worth 50 points and they will be on September, October and November. In addition, the final exam is comprehensive and worth 100 points. The final exam will be on Friday, Dec 14 2012 from 8am to 10am.

**Group Project and Presentation:** Students are required to finish a class project by the end of the semester and it has 50 points. Each group can have 2 or 3 members.

**Make-up Policies:** Make-up Quizzes will NOT be allowed, but you can drop 3 quizzes (including missing ones). Make-up tests and exams might be possible in very unusual situations such as illness. However, the official documents must be provided and the instructor should be notified in advance and approve your excuse.

**Study Suggestions:** You should always study homework questions in addition to the lecture. It is always good to preview or review lecture content before or after each class. Forming study groups is recommended and visiting my office frequently is highly encouraged.

**Grading Policy:** Your overall grade for this course will be based on in-class tests, quiz, and the final exam.

All tests	150 points
Final Exam	100 points
Project	50 points
Quiz	50 points
Total	350 points

**Cheating & Plagiarism:** Cheating or Plagiarism will not be tolerated. If you are caught in cheating or plagiarism, you will receive an “F” in the course.

**Grading Scale:**

A	90%
B	80%
C	70%
D	60%
F	Below 60%

**Disabilities Statement:** “In compliance with university policy, students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services in Downing University Center A-200. The phone number is 745-5004; TTY is 745-3030. Per university policy, please DO NOT request accommodations directly from the professor or instructor without a letter of accommodation from the OFSDS.”

**Withdrawal Date:** October 17, 2012 is the last day to withdraw from the course with a grade of W or to change enrollment from credit to audit. But you may withdraw from the class any time you like before this date.

**Mathematics Tutor Lab:** For free extra help in the class, tutors are available in the Math Lab in COHH and in the Student Learning Center. Please check at these facilities for the specific times and availability of tutors.

**Course Schedule:** All sections in the book will be covered in the semester.

This syllabus is subject to future revisions.