Math 170 – Calculus I

Fall 2014

Instructor – Dr. Michael Fraboni
Office: PPHAC 221
Phone: 610-861-1605
Email: frabonim@moravian.edu
Office hours: Tuesday and Thursday 9:30-11

Course Materials – The basic text is *Calculus, Single Variable, Second Edition*, by Jon Rogawski. In addition, all students are expected to have a graphing calculator or graphing app and bring it to class. We recommend the TI-83plus as a calculator; instructions will be provided on this calculator, but students who wish to use a comparable calculator may. Please refrain from using your cell phone or smartphone during class, unless asked to use as a resource.

Course Goals – In this course, you will be learning the mathematical language of change. Upon completion of this course, a student will be able to use the basic techniques of differentiation and integration, understand and apply the concepts underlying these processes, and understand the connection between the two operations, both theoretically and computationally. A student will also have a deeper insight into the power of Calculus as a tool for modeling real world situations, and be able to work with functions graphically, algebraically, numerically, and verbally.

Course Topics – We will briefly review Ch.1 and cover most sections of Ch.s 2-5. The topics to be covered are a review of Precalculus concepts, graphical and algebraic understanding of limits, the definition of a derivative, differentiation rules, techniques for graphing functions, applications of derivatives, the definition of an integral, graphical and algebraic understanding of integrals, and the Fundamental Theorem of Calculus.

Attendance – Class attendance is required. My definition of "Attendance" includes being prepared for class. Thus, bringing a textbook/notebook/pencil to class, reviewing notes before class, completing the homework assignments before the next class meeting, and participating in class discussions are all expected of each student.

If a student is absent, he/she must inform the instructor via email before or on the day of the absence. It is the student's responsibility to keep up with all work covered in class and all assignments, even if absent from class.

Workload – For every hour in class you should expect to spend 2 hours doing work outside of class. Thus, you are expected to put in **7-8 study hours per week**! Math is not a spectator sport; you cannot learn math without lots of practice!

Exams – There will be **two** in class exams and a cumulative final exam. If you must miss an exam, it is your responsibility to contact me *in advance* to make arrangements.

Study Guide – You are required to complete a study guide outline of each section of the textbook. These are due on each exam day and should be used as a study tool.

Proficiency Tests – In addition to the regular exams there will be **two** proficiency exams. When these exams are first given in class your recorded score will either be a 0% or 80-100%. If you receive a 0% then you may retake the exam as often as necessary within 4 weeks of the original exam date. When you score at least an 80% on a retake, your recorded score will be changed to an 80%. Thus the only way to receive a score of more than 80% is to do well the first time you take the test. NOTE: While a student may not earn a passing grade in Math 170 without earning at least 80% on each proficiency test, earning a passing grade on these tests is no guarantee of an overall passing grade for the course.

Culture Points – You are required to complete **15 Culture Points** by the end of the semester. There are no specific assignments for this portion of the course. Rather, there are many opportunities for you to explore mathematics in our culture. Activities that foster cultural awareness include (but are not limited to): attending talks, discussing a mathematical topic with a fellow student or professor outside of class, giving a talk, reading articles, or solving problems. More details are explained in the Culture Points section at the end of the syllabus. You must submit assignments worth a total of at least 5 Culture Points by *midterm*.

Projects – There will be 3-4 written assignment projects given throughout the semester. These projects should be completed outside of class time on an individual basis, unless noted. Directions and due dates will be given with each assignment.

Homework/Quizzes – Homework assignments will constitute an important part of this course and will be assigned daily. The problems assigned for homework represent a bare minimum, and you should work extra problems to ensure mastery of the material. It is vital that you do all the homework problems assigned; you should keep all your work in a binder or notebook for reference.

You will be assigned problems from the textbook as well as the online homework system WeBWorK. The text problems will not be grades but should be completed for practice. Your scores on the WeBWorK problems will make up your homework grade. A handout with details about WeBWorK will be distributed. The WeBWorK homework from a given lesson is due after the next class. This gives ample time to ask questions, correct any mistakes, and make any necessary revisions.

We will also have short, weekly, in-class quizzes, based on the assigned homework problems. The best way to do well on the quizzes is to do all the assigned homework. There will be no late assignments, no make-up quizzes, and make-up exams are given only in extreme, pre-approved cases.

If you work with someone else on homework for Math 170
(classmate, tutor, professor, roommate etc.),
PLEASE NOTE THIS at the top of your hand in assignment!

Evaluation, Grading, and Dates of Exams/Tests – Grades will be computed based on the weights below. Tentative dates for exams are listed below. It is within the purview of the instructor to apply qualitative judgment in determining grades for an assignment or for a course.

Culture Points (worth 4%)
Homework (worth 8%)
Quizzes (worth 12%)
Projects (worth 4%)
Limit Proficiency Test (worth 8%), **Wednesday, September 17**
. Retakes may be done through Friday, October 10.
Exam 1 (worth 16%), **Wednesday, October 1**
Derivative Proficiency Test (worth 12%), **Wednesday, October 22**
. Retakes may be done through Friday, November 21.
Exam 2(worth 16%), **Wednesday, November 12**
Final Exam (worth 20%), **Monday, December 8 at 8:30am**

Course grades will be determined by the following scale:

93-100: A	73-77: C
90-93: A-	70-73: C-
87-90: B+	67-70: D+
83-87: B	63-67: D
80-83: B-	60-63: D-
77-80: C+	< 60: F

Disclaimers – This syllabus is subject to change through the semester. Any updates to the syllabus will be announced in class. The instructor reserves the right to apply qualitative judgment in determining final grades for the course.

Learning Disability Accommodations – Students who wish to request accommodations in this class for a disability must contact Ms. Elaine Mara, assistant director of academic support services for academic and disability support, at the lower level of Monocacy Hall, or by calling 610-861-1401. Accommodations cannot be provided until authorization is received from the Academic Support Center.

Culture Points

> The mathematician's patterns, like the painter's or the poet's must be beautiful; the ideas, like the colours or the words must fit together in a harmonious way. Beauty is the first test: there is no permanent place in this world for ugly mathematics.
>
> *G. H. Hardy*

> To those who do not know mathematics it is difficult to get across a real feeling as to the beauty, the deepest beauty, of nature ... If you want to learn about nature, to appreciate nature, it is necessary to understand the language that she speaks in.
>
> *Richard Feynman*

One goal for this class is to provide some perspective of mathematics, and the role it plays in our modern world. Whether you plan to be a mathematician, a scientist, or simply a well-rounded liberal arts graduate, it is important to be aware of the role and nature of mathematics today. To help meet this goal, I am asking you to participate in "mathematical cultural awareness." There are no specific assignments for this portion of the course. Rather, there are many opportunities for you to explore mathematics in our culture. Activities that foster cultural awareness include (but are not limited to): attending talks, discussing a mathematical topic with a fellow student or professor, giving a talk, reading a paper, or solving a problem.

Basic overview of culture points

To get full credit for the Culture Points portion of your grade, you must accrue 15 points by the end of the semester. You gain points by attending seminars, colloquia or other talks; discussing mathematics outside class; reading articles; giving presentations; solving problems.

To get credit for an event, you will need to submit a short write-up for the event. This write-up will have two portions: (1) a short description of the event and (2) a reflection on the impact of that event on your own understanding of mathematics.

Points will be given based both on the quality of the event and the quality of the submission. The following sections provide details on this activity.

Rules for submission

Your culture point write-up must be neat and well-written (complete sentences, paragraph structure, etc.). I prefer your submissions to be typed, but I will accept hand-written submissions – particularly if there is a great deal of mathematical notation. For each submission, keep in mind that there are two portions:

1. **Summary of the event:** This section of the write-up should constitute no more than 50% of your submission. Summarize the talk, conversation, article, or event. If you were working on a problem, discuss *how* you approached the problem and whether you were able to arrive at a satisfactory answer (provide the actual solution or work on the problem on an attached page).

2. **Reflection on the event:** How does the event affect your understanding of mathematics and mathematicians? Do you have a greater appreciation of the role of mathematics in society or the nature of mathematical research? Does the event connect with the mathematics you've learned in this course (or any of your other mathematics courses)? If you worked on a problem, explain how your work on that problem has influenced the way you solve problems or your understanding of the mathematics involved.

Be sure to clearly state what the involved event was. If you watched an episode of a series, be sure to include the name of the episode as well as the name of the series. If you read an article, include a full citation of the article (do NOT include a copy of the article itself). If you attended a talk or seminar, include the name of the talk and of the speaker.

Miscellaneous rules

- You may make at most one culture point submission per week.
- At least one culture point submission needs to based on a talk, colloquium or seminar. At least one culture point submission needs to be based on an article or reading.
- Culture point submissions that do not follow the above rules (particularly regarding neatness and making full citations) will be penalized or rejected.
- Culture points above the required number will be used as extra credit.

Culture point activities

This list below is not comprehensive – it is meant to illustrate some possible activities and to provide a calibration for how many culture points different activities might provide. Note that the actual number of culture points you get will vary depending on the quality of your particular write-up.

- Attend an ϵ-talk (3 points). These short (10 to 15 minute) talks are given weekly as part of the Math Society's regular meetings.
- Attend a Math/CS colloquium (4 points).
- Attend a colloquium or conference off-campus (5 to 10 points). There are many opportunities to attend conferences throughout the valley, such as at Lafayette or Lehigh.
- Review an article on mathematics (2 to 4 points). I have attached a listing of places to look for articles, as well how many points you might get for different articles. Also look to sources such as the *New York Times*, the *Washington Post*, or PBS for mathematics in the news.
- Discuss a mathematical topic with someone outside the class (2 to 4 points) – this could be with roommates, teammates, family members, other professors. You can discuss a mathematical topic from the course or some other mathematical topic.

- Find mathematics in popular culture (2 to 4 points) – movies such as *A Beautiful Mind*, or references in *The Simpsons*. One source is *mathgoespop.com*. Also look for mathematics in the creation of movies by Pixar, LucasFilms or Dreamworks.

- Work on a problem outside the scope of the classroom (2 to 10 points). You might solve an interesting exercise or simply work on an interesting problem without quite reaching a solution.

Places to go for articles and other writings

Books and Journals

- (3 points) – mathematical articles from popular journals such as *Popular Science, Scientific American*, or *National Geographic*

- (3 points) – teaching-oriented journals such as *Mathematics Teacher* or *Mathematics Teaching*

- (3 to 5 points) – many books provide terrific insight to the nature of mathematics. Pick a chapter of almost any of the general mathematics books by Martin Gardner, Ian Stewart, Sherman Stein, or Keith Devlin.

There are many other interesting articles out there – look through some of the search engines available through Reeves to discover articles on your own.

You can also search `http://scholar.google.com` or `http://www.scholarpedia.org` for articles.

Math in the news

Look through the newspapers, especially the *New York Times*, the *Chicago Tribune* and other major newspapers for articles on mathematics in modern culture.

You can also find mathematics on the History Channel, the Discovery Channel, or PBS.

Web Resources

Below are just a few links to mathematical articles (and a rough indication of their point value)

- `http://www.maa.org/news/columns.html` (2 to 4 points)

  There is a host of columns here – all quite readable. Be sure to look through the archives to find articles of particular interest.

- `http://www-groups.dcs.st-and.ac.uk/~history/` (3 to 3 points)

  Look up a mathematician or mathematical topic here for a historical perspective on the mathematics you are learning. Start with those mathematicians that are mentioned in class (so who is that Simpson guy behind Simpson's rule for integration?).

- `http://www.cut-the-knot.org` (3 points)

  Lots of interesting mathematical tid-bits, most of which include an interactive applet for you to experiment with.

- `http://plus.maths.org/` (3 points)

  An on-line magazine devoted almost exclusively to questions in the mathematical sciences.

- `http://learner.org/interactives` (3 points)

  Search this site for College Mathematics activities. It has many interactive web apps for exploring mathematical topics.

- `https://www.youtube.com/user/Vihart` (3 points)

  Vi Hart has made many interesting and funny videos that present some great mathematical topics in very approachable ways.

Below are a few links to blogs hosted by professional mathematicians where interesting mathematical musings can be found (2 to 4 points)

- *What's New* by Terence Tao, `http://terrytao.wordpress.com/`
- *Not Even Wrong* by Peter Woit, `http://www.math.columbia.edu/ woit/wordpress/`