MATH 521 Fall 2016 Syllabus,
Aug. 15, 2016 Edition*

Prof. Zachariah Etienne

Class meets MWF 12:30PM–1:20PM, ARM 117

Instructor Contact Information

- zbetienne *<at>* mix.wvu.edu
- Office hours:
  - Armstrong Hall 409C
  - Monday and Friday 2:00–3:00PM, or by appointment

Course Website

- http://math.wvu.edu/~zetienne/

Course Preqrequisites

- Good computer programming skills: Computer programming will *not* be taught in this class. You will be expected to design, write, and debug (yourself) computer codes that are up to roughly 200 lines in length.
- Strong background in undergraduate mathematics:
  - Scientific notation/significant figures
  - Basic algebra: Solving Nonlinear Equations and Inequalities
  - Calculus I: Differentiation (chain rule, maxima/minima)
  - Calculus II: Integration (by parts & variable substitution)
  - Linear Algebra: Matrix algebra, computing determinants, properties of determinants, and eigenvalues/eigenvectors.

Text

- The lecture notes are designed to be self-contained, so no textbook is necessary. However, there is one recommended textbook for the course:
  - **"Numerical Recipes: The Art of Scientific Computing"**, by Press, Teukolsky, Vetterling, and Flannery. Any edition except the first should be fine.

  In addition, there is a comprehensive set of free, online **Suggested/Additional Reading** material, on the Course Website.

Course Objective

- This course is designed to build the necessary framework so that students will be able to solve mathematical problems with a computer. Topics will include
  - determining the scale of a problem/order of magnitude estimates
  - finite precision arithmetic

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*Note that this syllabus is subject to revision, at the option of the instructor. If revised, the new syllabus will not become official until the instructor has distributed it to students over email.

- approximation of functions (approximation theory)
- interpolation
- linear systems of equations
- root finding and optimization methods
- numerical integration
- solutions to ordinary differential equations (ODEs), including initial value and boundary value problems

Grading

Grading will be based on the total number of points earned by a student. The points will be divided as follows:

- Homework Assignments (See **Homework Policy** below): 40%
- Midterm Exams (Mon, Sept 12 and Wed, Oct 19, normal class time/location): 35%
- Comprehensive Final Exam (Mon, Dec 12, 2:00PM–4:00PM, normal class location): 25%

Grading Scale

- A- to A+: 90—100%
- B- to B+: 80—89%
- C- to C+: 70—79%
- D- to D+: 60—69%
- F: Below 60%

Homework Policy

There will be a total of eight homework assignments given in this class, consisting of four coding assignments and four non-coding assignments. The homework policy is as follows:

- For coding assignments, homeworks will consist of two documents stapled together. The first document will contain handwritten or typewritten answers to each problem (with plots) in order (no Appendices). *Any answers beyond what was asked will not be permitted.* The second document, stapled to the back of the first, consists of a printout of all source codes written to answer each problem, again in order. If these rules are followed exactly, the student will receive **3 bonus points** (no partial credit on this bonus). Homeworks without source code *will not be accepted.*
- For non-coding assignments, the use of calculators or any electronic computational aides is forbidden unless the homework problem states otherwise.
- Non-coding assignments will contain handwritten or typewritten answers to each problem in order. If this rule is followed, the student will receive **3 bonus points** (no partial credit on this bonus).
- Homework assignments must be carefully bound together using a single staple. If this rule is followed, the student will receive **2 bonus points** (no partial credit on this bonus).
- **Students may compare answers but may not collaborate on homework assignments; all assignments must be completed individually**. Written solutions or source code listings that are substantially the same will receive zero credit for all students involved.
- Full solutions will be due at the start of class on the due date; handing in parts of the assignment at different times is forbidden. Students are strongly encouraged to start early, or bugs may prevent them from handing in homeworks on time, and *the standard homework late penalty will be imposed.*
- Plots must have axes and all data series labeled accurately, or no credit may be given.
- Turning in homeworks on time is essential for doing well in this class, as homeworks are scheduled according to the lecture material. Late assignments will be penalized as follows:
  - Up to 48 hours late: 20% score reduction
  - 48–96 hours late: 50% score reduction
  - More than 96 hours late: 75% score reduction

Academic Dishonesty

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Campus Student Code. This Code may be found linked from the Office of Student Conduct web page: `http://campuslife.wvu.edu/office_of_student_conduct`. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me [the instructor] before the assignment is due to discuss the matter.

Inclusivity Statement & Accommodations

"The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me [the instructor] and make appropriate arrangements with the Office of Accessibility Services (304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see `http://diversity.wvu.edu`."

Students requesting special accommodations are required to inform the instructor at least 48 hours in advance of a test.

Electronic Device Policy

During lectures and exams, **cellular phones** and other electronic devices (including but not limited to **calculators**, tablet computers, laptops, PDAs, MP3 players, Blackberrys) are not permitted, except with the consent of the instructor. All forbidden devices must be turned off before the beginning of the class period and placed out of sight (for example, in a backpack or handbag) until the class has concluded.

A student's first violation of this policy **during lectures** will result in a verbal warning (one verbal warning per semester), and each subsequent violation *even during the same lecture* will result in a 1% deduction in the student's overall course grade. Violations of this policy **during exams** will result in a zero grade on the exam and possible expulsion from the course.

Intellectual Property Notice

All course materials, including lectures, class notes, quizzes, exams, handouts, presentations, and other materials provided to students for this course are protected intellectual property. As such, the unauthorized purchase or sale of these materials may result in disciplinary sanctions under the Campus Student Code.