# Math 2060 Technology Lab: Syllabus

## 1. Course Information

- Course. Math 2060 Section TBA, Semeter TBA
- Classroom & time. TBA, TBA.
- Credit. 1 semester hour. (This course is also C-I certified in the technological mode.)
- **Text.** S. Wolfram: An Elementary Introduction to the Wolfram Language, 2<sup>nd</sup> ed. Readable free online at:
  - https://www.wolfram.com/language/elementary-introduction/2nd-ed/
- **Technology.** You will need to download, install, and activate the most recent student edition of *Mathematica* (free TigerBytes download) on your own computer.
- **Time.** This class meets for two 50-minute periods per week. <u>Attendance is required.</u> Students are expected to spend an an additional 1.5 hours (approx.) per week working on assignments, for a total learning time of approximately 45 clock hours.
- **Moodle.** I will post announcements and links to *Mathematica* files containing class notes, demos, and guidelines for projects.

## 2. Instructor Information

- Instructor: Dr. James J. Madden
- Office: 213 Prescott Hall
- Office Hours: T Th 11–noon, or by appointment. See the course Moodle for updates.
- Mobile: 225 978 3525
- $\bullet$  email: mmmad@lsu.edu

## 3. Course Description

This is a 1-credit-hour course designed to enable you to use *Mathematica* as a tool for exploring, visualizing, and communicating about important concepts from calculus, probability, statistics, data science and other areas of mathematics. According to the catalog description, students will use computers "for investigating, solving, and documenting mathematical problems." This will include "numerical, symbolic, and graphical manipulation of mathematical constructs discussed in MATH 1550, 1552, and 2057."

As a 1-credit lab course, students are expected to devote a total of at least 48 clock hours to the course, including about 24 hours in class (28 class meetings) and about the same amount of time working outside of class on assignments.

## 4. What students will do

Students in this course complete four to six projects (as determined by the instructor during the semester) as well as a final project. Each project results in a "deliverable" in the form of a *Mathematica* notebook, which is expected to include:

- (a) documentation of the project goals and the student's plan for realizing them,
- (b) programs written in the *Mathematica* programming language;
- (c) commentary on the programs written (to make the logic of the program evident to any reader);
- (d) formatting, using *Mathematica* presentation tools, to achieve a well-organized presentation.

A guide for each project is provided. The guides model the expected work, documentation, organization, and formatting. Guides also include benchmarks for specific grades.

The instructor will interact with students while they prepare their projects to provide advice and guidance. If a student undertakes a particularly challenging project, the instructor is prepared to provide customized assistance.

#### 5. Graded work & grading policy

Kind	Comment	Value	Method
Projects	4 to 6	60%	completeness, accuracy & scope $(60\%)$
			effective communication $(40\%)$
Final project	Due exam week	15%	completeness, accuracy & scope $(60\%)$
			effective communication $(40\%)$
Attendance	28 meetings	25%	2 excused no penalty

The course grade is based on the final average. Below each grade is the minimum average required to earn that grade. Grades may be adjusted upwards at my discretion, using the same creiteria for all students and preserving the ordering of students by average.

A+	Α	A-	B+	В	B-	C+	$\mathbf{C}$	C-	D+	D	D-
97	93	90	87	83	80	77	73	70	67	63	60

#### 6. Course goal & learning objectives

**Overarching goal.** Students will create written reports (projects) which investigate a variety of mathematical concepts. The reports, created using mathematical software, will contain both mathematically sound procedures, calculations, graphs, etc., as well as appropriate discussions and interpretations of the concepts studied. Reports shall be well-organized, formatted as engaging presentations, and shall include clear explanations in English.

**Objective 1.** The student will be comfortable using the following *Mathematica* objects/concepts/tools to prepare meaningful programs of their own design:

- (1) *Mathematica* front end (notebooks, help)
- (2) Important Mathematica functions:
  - basic: List, Table, Do, Print, etc.
  - complex: Plot, Plot3D, Solve, Manipulate, etc.
  - user-defined functions (including recursive definitions)
- (3) Mathematica programming language syntax
- (4) Graphics in *Mathematica*
- (5) Making presentations in Mathematica
- (6) Interacting with other programs: Importing and Exporting

**Objective 2.** The student will discuss and illustrate a selection of the following mathematical topics:

- (1) 2D and 3-D Coordinate systems
- (2) Secant and tangent lines, derivatives of functions of 1 variable
- (3) Riemann Sums and Riemann Integrals
- (4) Functions of two variables: graphs, continuity, level sets, partial derivatives, gradient, tangent plane, linear & quadratic approximation
- (5) Random variables, probability distributions, probability models
- (6) Statistical inference
- (7) Recursive functions
- (8) Neural nets

**Objective 3.** The student will acquire the following communication skills:

- (1) Document a program of their own design using comments;
- (2) Prepare a presentation using *Mathematica* notebook formatting options;
- (3) Create images to illustrate fundamental mathematical concepts;
- (4) Import, manipulate, and export data and images;
- (5) Incorporate exported data or images in other documents.

#### 7. LSU Communicator Certificate

Through the Geaux Communicate initiative, LSU provides a variety of opportunities to help you develop communication skills essential for your success in college and beyond. This includes enhanced experiences like Math 2060, which is a Communication-Intensive (C-I) course. In this course, you will learn, practice, receive feedback, and apply written and technology communication skills through communication-centered activities and assignments, accounting for at least 40% of your grade. This course is also a stepping stone towards the LSU Communicator Certificate and LSU Distinguished Communicator Medal program. Please take not of the fact that the LSU CxC Studios offer a wealth of resources to enhance your communication abilities further. You are welcome to connect with them as you work on your assignments. For more information, visit www.cxc.lsu.edu.