Syllabus for PHYS 272
Methods of Applied Physics (MAP) – Fall 2014

Class Times: MWF, 1:00-1:50 PM, JCL 219
Instructor Information: Dr. Mike Larsen

Office Phone: 843-953-2128

Office Hours: Mondays 12-1 PM; Tuesdays 1-2 PM; Wednesdays 9:30-10:30 AM and 12-1 PM. (But stop by anytime, just realize that other times I'm not certain to be there or available).

Office Location: JCL 217 (I also am sometimes in my labs during office hours – JCL 220, JCL 221, and Lightsey 336. Check the door of room 217 for my current location. Note that I also leave my door closed pretty often for the air conditioning in my office; if the door says I'm there, please knock! If I'm un-interruptible, there'll be a note on my door that says so.)

Email address: LarsenML@cofc.edu (please use sparingly; I'd rather talk to you in person if you have a question or a concern.)

Prerequisites: PHYS 112 or HONS 158 or Permission of Instructor

Course Webpage: http://larsenml.people.cofc.edu/phys272_fall14.html
(Please see course page for full description of course, rationale, and supplementary information).

Final Exam Time Period:
Monday, December 8th, 12-3 PM.

Attendance Policy
It is expected that you will attend class. I will. You are responsible for any material missed in class, including announcements about homework/test date changes, etc. That being said, I do not formally take attendance for this course.

When you attend class, I expect you to show up on time.

Textbook: None required. If you really want to purchase a book of some sort to help, however, the following two books are my top recommended choices:

- Boas, M.L. (2006). *Mathematical Methods in the Physical Sciences* (3rd Ed.) Wiley.
- Nearing, J. (2010). *Mathematical Tools for Physics* Dover. (Also available [free!] online at http://www.physics.miami.edu/~nearing/mathmethods).

The reason we do not have a required book is that the focus of this course is fundamentally on *applications*, and I have yet to find a book that is both comprehensive enough and applied enough for our purposes. It could be very useful to be aware of other texts that discuss much of this material in a different way. Remember, the whole goal to this class is to make you more comfortable with the tools and techniques that you will be using in those classes. Many of your other upper-level physics books (Classical Mechanics, Quantum, E&M) will have little sections on these mathematical tools; those are good sources to go to if you need help! Additional texts to aid you in mastering the course material have been included in a separate handout and on the course webpage.

Classroom Policies

Please treat your classmates and professor with the respect due to them as fellow adults and human beings. Your professor always reserves the right to dismiss you from the room.

Please do not text message, browse the internet, check email, or engage in other non-class-related communications during class.

Cell phones – Few things irritate your professor as much as having his lecture interrupted by a cell phone ring. It totally makes him lose his train of thought. Please be considerate and turn it on vibrate during lectures. Also, all cell phones must be turned off (NOT JUST TO VIBRATE) during all quizzes and exams. This means you may need to buy a calculator not on your cell phone or wear a watch, because you will not be permitted to use your phone for any purpose during a test. If your professor sees a phone out (or hears one ring) during an exam, it will be assumed that you were using it to cheat.

Honor Code / Code of Conduct
It is expected that you will adhere to the university's honor code and student code of conduct, as can be found in your student handbook.

Students with Disabilities
The College will make reasonable accommodations for persons with documented disabilities. Students should apply at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying your professor as soon as possible and subsequently contacting your professor again at least one week before any specific accommodation is needed.

Grading
Grades will be based on three components:

- Performance on midterm exams (we plan to have 4) (60%)
- Performance on regularly assigned homework (25%)
- Performance on the comprehensive final examination (15%) (can count for up to 30%; see below)

Your instructor makes every effort to return homework and quizzes as soon as possible after receiving them. Because of this, you will often receive homework back the class after it was due and you will often go through some of the problems in class. Since it would be unfair to accept work from students who had the advantage of hearing the correct answers in class, late work will be docked at least 15% and up to 50% (at instructor discretion, based on circumstances) if turned in between the original due date and the next class, and will not be accepted for credit more than one class after it was originally due. Your lowest homework grade will be dropped.

There will be no makeup exams for any reason. If you have a conflict with a scheduled exam, you may work with your professor to try to schedule to take the exam **before** *the scheduled exam time/date (but not after).* If you have a known conflict – due to a sporting event, religious observance, interview, or other important event – it is your responsibility to use office hours to discuss options with the instructor *well in advance of the date in question* to try to work out a mutually acceptable solution. (This means approach Dr. Larsen weeks ahead of time, not days or hours).

Homework will be assigned approximately weekly. Please ensure that your solutions are complete, legible, and logically coherent. You may work with your classmates on homework, but – if you do – make sure (i) you *clearly* indicate on your work who else you worked with.

Do this on every problem you collaborated on, and (ii) make sure the work is ultimately your own. I am very tolerant of collaborative work on homework, but I get rather irritated if multiple people make the exact same careless error. By all means, work with other students if you want in developing an approach to a problem – but turn in your own final solution!!! (Incidentally – it is not required to type your homework, but – if you do – it is appreciated.)

Following policy, the final exam is required. There is a little extra wrinkle regarding the final, however; the (comprehensive) final will count for at least 15% of your grade, but may count for up to 30%. I will allow you to replace your lowest midterm exam score with your final exam grade, if your final exam grade is better than your lowest midterm score. Because you have the ability to drop this lowest midterm score, *no makeups for missed exams will be given!!!* The "0" score you record on the missed exam will be replaced by your final exam score. That does mean, however, that your "safety net" is gone; if you do poorly on one of the other midterm exams, unfortunately you will not be able to erase that score.

Grading Scale: The formal numerical scale might move around a little bit depending on the class' performance, but the final grading scale will be *no more stringent* than:

A	>90	C+	79
A-	90	C	71-78
B+	89	C-	70
B	81-88	D	60-69
B-	80	F	<60

Midterm Exam Dates (TENTATIVE)
Friday, September 12 Friday, October 10 Friday, October 31 Monday, December 1

And, of course, your comprehensive final will be a timed 3 hour exam on Monday, December 8th, from noon-3 pm.

Videorecording
Dr. Larsen is constantly trying to improve his teaching skills. In an effort to aid in instructor evaluation, he may decide to videotape the classes this semester. Dr. Larsen is *not* responsible for making these tapes available for student use, and reserves the right to use the recordings for his purposes. If you have any questions or concerns about this, please visit Dr. Larsen during office hours.

Course Goal
This course is designed to develop student skill in applying mathematical tools/concepts developed formally in the Math Curriculum for use in the undergraduate Physics curriculum.

Learning Objectives
This course endeavors to aid the motivated student in the following tasks:

- Develop a familiarity and working knowledge of the basic mathematical techniques and tools used by Physicists daily.
- Geometrically and/or physically interpret mathematical expressions given an applied context.
- Connect ideas from the Mathematics curriculum to applications in the Physics curriculum.
- Learn basic techniques to solve differential equations.

Learning Outcomes
At the end of this course, successful students will be able to:

- Graph functions of a single variable without resorting to use of a computer algebra system or hand-held calculators.
- Use basic principles from Linear Algebra to solve problems.
- Geometrically interpret and analytically calculate vector calculus expressions.
- Solve simple, physically motivated differential equations given appropriate boundary and/or initial conditions.
- Interpret and/or analyze data using Fourier, statistical, and/or probabilistic techniques.
- Associate particular mathematical techniques to their area of utility in the undergraduate Physics curriculum.