Mathematics for Biomedical Physics
Physics 3700
Fall 2016

Lectures:
Mondays and Wednesdays, 10:40am to 12:30pm in 245 Physics Building

Final Exam:
Tuesday, December 20th from 8:00am to 10:30am in 245 Physics Building

Required Text:
Mathematics for Physicists by Martin and Shaw
Purchase new from wiley.com for $66 or new from amazon.com for $45
Solutions to odd problems can be found at wiley.com.

Recommended Texts:
I hope to supplement this course with other texts, including **Physical Models of Living Systems** by Nelson and notes from Professor Wadehra. I will be putting all relevant text from these sources on Blackboard. You may also want to have access to Calculus, Geometry, or Linear Algebra texts, which you can get from our library if wanted.

Lecturer:
Professor C.V. Kelly
Office: 283 Physics Building
Email: cvkelly@wayne.edu
Office Hours: Mondays, 1:00pm to 2:15pm
Wednesdays, 9:00am to 10:15am
or by appointment. I am generally happy to answer quick questions on a drop-in basis. But for longer discussions, please aim stop by during office hours or make an appointment.

Graduate Teaching Assistant:
Abir Maarouf Kabbani (ez7668@wayne.edu)
Office Hours: Tuesdays, 11am to noon
Abir will be primarily in charge of grading, hosting office hours.

Undergraduate Teaching Assistant:
Prisca Abraham (priscabraham@gmail.com)
Office Hours: TBD
Prisca will be primarily in charge of running voluntary discussion sections.

Course Web Page: WSU Blackboard @ blackboard.wayne.edu

Pre-requisites: PHY 2130/2140 or PHY 2170/2180; MAT 2010; MAT 2020; current GPA $\geq$ 3.0

Co-recommended: PHY 3750

How to be successful in this course:

The key to being successful in this course is to engage at all levels. Read the relevant sections of the text before lectures, be attentive during lectures, volunteer to answer questions during lecture and do problems on the board, ask questions during lectures and office hours, learn from your mistakes on homework, quizzes, and exams, and follow up on anything that you don't understand. Students who display a strong desire to thrive will display their efforts via detailed questions from the readings or assignments that reflect their individual effort to understand the subject matter. Utilize the numerous resources available to you (namely your textbook and material on Blackboard) and recognize that success in this course will not be achieved through passive observation but rather through active engagement.

Course Content:

This course will primarily work though the text "Mathematics for Physicists", including chapters on number theory, function and equations, differential calculus, integral calculus, series, expansions, complex numbers, partial differentiation, vectors, vector calculus, matrices, multidimensional integrals, Fourier analysis, and differential equations.

Learning Objectives:

1) Demonstrate a conceptual understanding of advanced mathematics.
2) Use advanced mathematical routines to solve problems.
3) Be prepared to apply advanced mathematics in upper level Physics courses.

Homework:

Homework will be assigned and submitted on a weekly basis and account for 20% of your final grade. Often, showing one's work will be necessary to get full marks. Diagrams and derivations are often required. Occasionally, only a selection of the required homework answers will be graded. Homework questions will mostly be graded on a 0, check-, check, check+ scale while some problems will be graded in greater detail.

0 : The question was not seriously attempted. 0 Points.
Check- : A strong effort and significant errors were made. 1 Point.
Check : The answer is close but with minor mistakes OR the answer is correct but insufficient work was shown to demonstrate student understands. 2 Points.
Check+: The answer is perfect. The answer clearly shows that the student well understands the subject. 3 Points.

Homework solutions will be provided and the students are strongly encouraged to compare their answers to the solutions. Some questions can be answered in multiple ways and comparing your answers to the solution may often be informative.

Students are encouraged to work together on the homework via small study groups. However, each student is required to write their own answers without copying or plagiarizing others. Your homework is expected to be a reflection of your effort and your understanding. Any copying or plagiarizing will be considered cheating, result in no credit, and possibly university-level disciplinary actions. (http://www.otl.wayne.edu/wsu_integrity.php)

Participation:

Your participation in all activities of the course will help you and other students learn the material. Participation may count for up to 10% of your final grade. Students will be often asked to

participate by solving problems for the class and demonstrating how they performed various homework assignments.

Quizzes:

Quizzes will be given at least weekly, and they will contribute to 20% of your final grade. *The two lowest quiz scores will be removed from your final grade calculation.* Some quizzes will be announced before hand, you will know what will be on them, and you will have time to study. Other quizzes will be pop quizzes about material that we have yet to discuss in lecture. For example, I may give impromptu reading quizzes to ensure you're reading the text before coming to class. Success in this class will depend on staying on top of your work and being prepared for class.

Exams:

There will be 2 mid-semester exams and 1 final. All exams will be cumulative, with an emphasis on the most recent section. Exams will be given during the lecture time. The exams may include multiple choice, short answer, or long answer problems. Make-up exams are not available barring exceptional circumstances as assessed solely by the lecturer. A re-grading of some exam answers may or may not be permitted if requested. However, any re-grading may result in an increase, decrease, or no change in the grade given with a final decision made by the lecturer.

In sum, the exams will make up 50% of your final grade. The final exam will be initially worth double each of the mid-semester exams towards your final grade. *However, you may drop either one of your mid-semester exams or 1/2 of the final exam contribution towards your final grade.* This means that one of two conditions will be true: (1) your three exams may all end up equal value (17% each) or (2) one midterm will be 0%, the other midterm will be worth 17%, and the final will be 33%.

Open Notes and Open Textbook:

All exams and quizzes will be open note and open textbook. However, only notes that you have personally written by hand and only the required textbook will be permitted. No calculators, computers, phones, or non-preapproved textbooks are allowed for use on the exams. **Any use of telephones during an exam is strictly forbidden and may result in the assessment of cheating.** For the exams, any use of non-sanctioned assistance (e.g., electronic devices, other people, non-sanctioned cheat-sheets, or non-required books) will be considered cheating, result in no credit, and possibly university-level disciplinary actions.

Final Grade:

The final grade (FG) will be a combination of the grades from the homework (HW), Quizzes, (Q) Participation (P) the two mid-semester exams (E1, E2), and the final exam (F). The two lowest quiz grades will be dropped from the total Q value. The lowest E1, E2, or F will be removed from the FG calculation such that the FG will be calculated according whichever of the following methods results in the highest final grade for each student.

FG	Letter Grade
85-100%	A-/A
70-84%	B-/B/B+
60-69	C-/C/C+
50-59	D-/D/D+
<50	E

$$FG = 0.1*P + 0.2*Q + 0.2*HW + 0.17*E1 + 0.17*E2 + 0.17*F$$
$$FG = 0.1*P + 0.2*Q + 0.2*HW + 0.17*E1 + 0.33*F$$
$$FG = 0.1*P + 0.2*Q + 0.2*HW + 0.17*E2 + 0.33*F$$

Final Grades may be scaled and converted to a final letter grade according to the above table.

Students with disabilities:

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours or at another agreed upon time to discuss your needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Syllabus Modifications:

I will be trying a number of teaching techniques throughout this semester, some of which are described in this syllabus. As I learn what is working and what is not, I will be modifying the policies of this course. And so, this syllabus is a dynamic document that may be updated as the semester progresses.

Tentative Lecture Schedule:

Week	Date		Topics and Activities	Readings
1	8/31	W	Syllabus, numbers, variables, and functions	Ch. 1
2	9/7	W	Basic functions and equations	Ch. 2
3	9/12	M	Differential calculus	Ch. 3
	9/14	W	Differential calculus and integral calculus	Ch. 4
4	9/19	M	Integral calculus	
	9/21	W	Series and expansions	Ch. 5
5	9/26	M	Complex numbers and variables	Ch. 6
	9/28	W	Partial differentiation	Ch. 7
6	10/3	M	Review	
	10/5	W	**EXAM 1**	
7	10/10	M	Vectors	Ch. 8
	10/12	W	Matrices and determinants	Ch. 9
8	10/17	M	Eigenvalues and eigenvectors	Ch. 10
	10/19	W	Applications of linear algebra	
9	10/24	M	Line and multiple integrals	Ch. 11
	10/26	W	Line and multiple integrals	
10	10/31	M	Vector calculus	Ch. 12
	11/2	W	Vector calculus	
11	11/7	M	Review	
	11/9	W	**EXAM 2**	
12	11/14	M	Fourier analysis	Ch. 13
	11/16	W	Fourier analysis	
13	11/21	M	Ordinary differential equations	Ch. 14
14	11/28	M	Ordinary differential equations	
	11/30	W	Advanced differential equations	Ch. 15 & Ch. 16
15	12/5	M	Probability distributions	Nelson
	12/7	W	Statistical significance	Nelson
16	12/12	M	REVIEW	
17	12/20	T	**FINAL EXAM – 8 am – 10:40 am in PHY 245**	

THIS SCHEDULE IS SUBJECT TO CHANGE