

**PHYS 317 Methods of Mathematical Physics**

Instructor: Maia Magrakvelidze; (office: JEPS 429)

***Textbook: None required!***
 Prerequisites: PHYS 106 and MATH 122  
 Recommended: MATH 224

Section	Time	Room #
LECTURE (MWF)	9:00-9:50 a.m.	JEPS 417

***Recommended Textbooks:***

1. “*Mathematical Methods in the Physical Sciences*” (3<sup>rd</sup> Edition) by M. L. Boas, ISBN 0471198269
2. “*Mathematical Methods for Physicists*” (5<sup>th</sup> Edition) by George B. Arfken and Hans J. Weber, ISBN 0120598256, or (7<sup>th</sup> Edition) ISBN 9780123846549
3. “*Mathematical Methods for Physics and Engineering*” by K. F. Riley, M. P. Hobson, S. J. Bence ISBN 0521679710

**Course Description and Objectives:** The course introduces students to some of the mathematical tools that are needed to succeed in upper level physics courses. Some of the familiar math concepts are reviewed and new ones are introduced. We will start with assorted tools of the trade and simple problems and progress toward more challenging topics keeping in mind that math is simply a tool that aids in advancing physics. Students should expect this course to be challenging and informative. Methods of Mathematical Physics covers the basic topics such as: vectors, tensors, matrices, infinite series, complex analysis, ordinary and partial differential equations, integral transforms, asymptotic expansions, special functions, and numerical methods.

**Student Learning Outcomes:** PHYS 317 satisfies the general education requirement in quantitative reasoning. As such, success in this course means that students have demonstrated an ability to interpret quantitative/symbolic information; students have practiced the conversion of relevant information into various mathematical/analytical forms (e.g., equations, graphs, diagrams, tables, words); students have applied analytical techniques or rules to solve problems in a variety of contexts; and students should have a better appreciation for how analytical techniques or rules are used to address real-world problems across multiple disciplines.

**A. Homework:**

There will be one homework (on average) assigned each week. Doing homework problems is an important part of obtaining success in class, helping you organize your thoughts, learn the concepts, and apply them. Try to do Homework as soon as possible after the lecture, so you don't get behind. **NO LATE HOMEWORK IS ACCEPTED.**

**B. Help:** Any student needing help should take full advantage of instructors during her/his office hours or by appointment. **Students should give an honest and exhaustive effort and have her/his questions clearly formulated BEFORE seeking help.**

**C. Reading:** Even though there is no required text book, students are advised to regularly review class notes and go through the material in the suggested textbooks.

**D. Exams:** There are two 1-hour exams during the semester (each 100 points) and one two-hour final exam (200 points). No makeup exams. **The final exam is mandatory and comprehensive.** The exams are closed-book and closed-note. A sheet of “useful equations” will be provided with your exam, but please note that having equations available does not guarantee success – understanding the material is the key. Try to study the concepts and how to apply them; **do not** just try to memorize how to solve **particular** problems. **Make-up exams are given only in extraordinary circumstances and only with prior arrangement.**

**E. Quizzes:** There will be one quiz in every week on average during the semester (total 11 quizzes). Each quiz will include material covered in previous classes (total 300 points). Lowest grade quiz will be dropped.

**F. Grading:** Grades are determined on a 1000 point scale as shown below. You cannot get a good grade in the course unless you do all the homework, and take all the exams.

A	A-	B+	B	B-	C+	C	D	F
930- 1000	900- 929	870- 899	830- 869	800- 829	770- 799	700- 769	600- 699	Below 600

**Available points:**

Final exam: 200 points;  
 Exams (each 100): 200 points;  
 Quizzes: 300 points;  
 Homework: 300 points;  
 Total available: 1000 points.

**Plagiarism:** Plagiarism and cheating are serious offenses and may be punished by failure on the exam, paper or project; failure in the course; and/or expulsion from the university.

**Note:** If you have any condition such as a physical or learning disability, which will make it difficult for you to carry out the work as I have outlined it or which will require academic accommodations, please notify me.

**Honor Code:** I encourage students to work collaboratively; however, cheating is a serious offense. Please read and understand your University of Mary Washington Honor Code.

### Tentative Course Schedule: Math Methods PHYS-317, Fall 2017

Week		#	Date	Discussion Topics	Reminders
1	M	1	8/28	Intro	
	W	2	8/30	Vectors: notation, algebra, unit vectors,	
	F	3	9/1	Vectors: coordinate systems, special products,	
2	<b>M</b>		<b>9/4</b>	<b>Labor day</b>	
	W	4	9/6	Matrices	<b>HW-1 due</b>
	F	5	9/8		<b>Quiz1</b>
3	M	6	9/11		
	W	7	9/13	Tensors	<b>HW-2 due</b>
	F	8	9/15		<b>Quiz2</b>
4	M	9	9/18		
	W	10	9/20	Functions of several variables	<b>HW-3 due</b>
	F	11	9/22		<b>Quiz3</b>
5	M	12	9/25	Vector Calculus	
	W	13	9/27		<b>HW-4 due</b>
	F	14	9/29		<b>Quiz4</b>
6	M	15	10/2		
	W	16	10/4	Complex numbers	<b>HW-5 due</b>
	F	17	10/6		<b>Quiz5</b>
7	M	18	10/9		
	W	19	10/11		<b>HW-6 due</b>
	F		10/13	----	<b>Exam1</b>
8	<b>M</b>		<b>10/16</b>	<b>Fall break</b>	
	W	20	10/18	Diff. equations	
	F	21	10/20		<b>Quiz6</b>
9	M	22	10/23		
	W	23	10/25		<b>HW-7 due</b>
	F	24	10/27		<b>Quiz7</b>
10	M	25	10/30	Partial Diff equations	
	W	26	11/1		<b>HW-8 due</b>
	F	27	11/3		<b>Quiz8</b>
11	M	28	11/6	Fourier Transforms	
	W	29	11/8		<b>HW-9 due</b>
	F	30	11/10		<b>Quiz9</b>
12	M	31	11/13	Series	
	W	32	11/15		<b>HW-10 due</b>
	F		11/17	-----	<b>Exam 2</b>
<b>13</b>	<b>M</b>		<b>11/20</b>	<b>Thanksgiving</b>	
	<b>W</b>		<b>11/22</b>		
	<b>F</b>		<b>11/24</b>		
14	M	33	11/27		
	W	34	11/29		<b>HW-11 due</b>
	F	35	12/1	Special Functions	<b>Quiz10</b>
15	M	36	12/4		
	W	37	12/6		<b>HW-12 due</b>
	F	38	12/8		<b>Quiz11</b>
16				<b>Final</b>	

**Tentative schedule for the HW: Math Methods PHYS-317, Fall 2017**

HW	Given on	Due date			Points	Total	
		Date	Day	Time			
1	8/28	9/06	Wednesday	4:45 PM	25	25	week1
2	9/06	9/13	Wednesday	4:45 PM	25	50	week2
3	9/13	9/20	Wednesday	4:45 PM	25	75	week3
4	9/20	9/27	Wednesday	4:45 PM	25	100	week4
5	9/27	10/04	Wednesday	4:45 PM	25	125	week5
6	10/04	10/11	Wednesday	4:45 PM	25	150	week6
							week7
7	10/18	10/25	Wednesday	4:45 PM	25	175	week8
8	10/25	11/01	Wednesday	4:45 PM	25	200	week9
9	11/01	11/08	Wednesday	4:45 PM	25	225	week10
10	11/08	11/15	Wednesday	4:45 PM	25	250	week11
11	11/15	11/29	Wednesday	4:45 PM	25	275	week12
	11/20	Thanksgiving					week13
12	11/29	12/06	Wednesday	4:45 PM	25	300	week14

**Dr. Magrakvelidze ☺**

	Monday	Tuesday	Wednesday	Thursday	Friday
7:00					
8:00					
9:00	Math Methods Jepson 417	Univ.Phys. Lab Jepson 217	Math Methods Jepson 417	Class prep	Math Methods Jepson 417
10:00	Univ.Physics Jepson 219		Univ.Physics Jepson 219	Class prep	Univ.Physics Jepson 219
11:00					
12:00	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
1:00					
2:00	Research	FSEM HCC 327		FSEM HCC 327	
3:15	Research				
4:00	Research	Research	Research	Research	
5:00	Research	Research	Research	Research	

OFFICE HOURS by appointment (open door policy)