

# Math Phys (Phys 382) Syllabus

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## 1 How to Find Me

The best way to reach me is **e-mail**, [edis@truman.edu](mailto:edis@truman.edu). Otherwise, you can try calling my office at 785-4583, or faxing me at 785-4045.

My office hours are, Tuesdays: 10:30–11:00, 13:00–15:00, 16:30–17:00; Wednesdays: 13:30–14:30; Thursdays: 10:30–11:00, 14:30–15:00, 16:30–17:00. There's a good chance I will be around my office at other times as well. To see when I am most likely to be available, check my **typical schedule** ([www2.truman.edu/~edis/courses/schedule.html](http://www2.truman.edu/~edis/courses/schedule.html)).

I will be using the web to post course-related documents. Please bookmark the Phys 382 home page, [www2.truman.edu/~edis/courses/382/](http://www2.truman.edu/~edis/courses/382/).

## 2 Course Description

Phys 382 is a survey of basic mathematical methods useful for physicists. It requires a solid background in calculus, and previous experience with the mathematics encountered in other physics courses will be useful. I will, however, assume little beyond what you should have picked up in your introductory physics and math courses.

As with most physics courses, Math-Phys involves a fair amount of homework and individual study of the textbook. You learn mathematical methods by applying them in solving problems, more than by reading the book or understanding the lectures.

### 3 Schedule

**Lectures:** Tuesday, Thursday from 9:00 to 10:20 in MG 1099.

**Recitation:** Wednesday 9:30 to 10:20 in MG 1099.

**Final Exam:** Thursday May 7, 7:30 to 9:20 in MG 1099.

We'll negotiate what to do with recitations.

### 4 Course materials

**The textbook:** Mary L. Boas, *Mathematical Methods in the Physical Sciences*, 3rd edition, John Wiley & Sons.

I do not intend to follow the textbook slavishly, though it will be your primary point of reference.

I also plan to introduce a more computational perspective occasionally; after all, we have moved from the days of tabulated functions to number-crunching and computer visualization. I will not emphasize this too heavily, so any information I give in lectures should suffice.

### 5 Homework

Homework is *important*. It will determine 30% of your final grade.

I will give a list of homework problems most every week. They will be due in one week, unless I explicitly state otherwise. Most problems will be from Boas, but from time to time I might add something else.

I do not mind you discussing the homework with one another as well as with me. However, I expect you to turn in the results of your own efforts—not group solutions, and certainly not solutions directly borrowed from someone else. If I find homeworks too similar to each other, especially if they make the same mistakes, you will have some explaining to do.

## 6 Exams

There will be two midterms, both determining 15% of your final grade. The final is worth 30%.

You will be allowed to consult your textbook and notes during all exams. You will not need a calculator.

Each exam will also include at least one question I will give you a few days *before* the actual test. This will be a slightly more difficult question which you can work on at home, with less time pressure; you will bring your answer and hand it in with the in-class exam. I expect you to work on this strictly alone, without discussing it with others.

I care about maintaining academic integrity, and I will apply all relevant Truman policies. See the [Student Conduct Code](#).

## 7 Project

The remaining 10% of your grade will come from a special project you will undertake.

The nature of this project is largely up to your own initiative. After about halfway through the semester, I expect you to schedule a ten minute meeting with me in which we will discuss your project. During this meeting, I can present you with some possibilities. It would be best, however, if you came to me with some prior idea about what you want to do. Propose something!

For example, you might tell me asymptotic series have caught your attention, and you would like to do something which will help you explore their use in physics in a bit more detail. We can then discuss this further, and end up deciding you should prepare a short term paper talking about asymptotic series and chaotic signal processing, or their role in perturbation theory. Or you might want to do some computational work; say, write a program which compares a function with an asymptotic series approximating it, and graphing how and where they diverge.

It is also perfectly acceptable to take on a project relating to some student research you are already involved in, or which fits in with another physics course you are taking or have taken. All I ask is that it be an application of some mathematical methods, and that it require you to do some minor research that goes beyond what I present in the classroom.

The idea here is to let you use your initiative, and go beyond the usual routine of taking notes, doing homework, and surviving exams.

## 8 Final grades

As with every other aspect of the course, I intend to be flexible. If you get less than 50% in your overall grade, you will certainly fail, and 90% or better will certainly be an A, but otherwise, I don't want to declare rigid boundaries such as "65%-77% is a C" and so forth.

If you want to know how you are doing, or what sort of performance on the final you would need for an A, or have similar grade-related concerns, just stop by my office and ask. I should be able to give you a fair estimate of where you stand.

## 9 Returned Work

I will return graded work to you during recitation or class. Keep all your work in one place for reference, and for possible inclusion in your University Portfolio. I may discard any papers that have not been picked up after a week from when they were first made available to you.

## 10 Make-Ups

It is hard to arrange for appropriate make-ups for exams or homeworks in a course like this. So I expect you will do everything possible to turn your work in on time, and so avoid later hassle for both me and yourself.

Nevertheless, you may find you have missed something because of a legitimate excuse like being badly sick or having a death in your family. In this case, come and speak with me, and I will decide, on a case-by-case basis, how to make up what you have missed. I will typically assign you some appropriate extra work, have you take a make-up exam in my office, or something similar.

## 11 Outline of Topics

	Book Chapters	Tests
<b>1</b>	Series	First Midterm
<b>2</b>	Complex Numbers	
<b>3</b>	Linear Algebra	
<b>4</b>	Partial Differentiation	
<b>7</b>	Fourier Series	
<b>8</b>	Ordinary Differential Equations	Second Midterm
<b>11</b>	Special Functions I	
<b>12</b>	Special Functions II	
<b>13</b>	Partial Differential Equations	
<b>6</b>	Vector Analysis	<b>Cumulative Final</b>

## 12 Assignments

I will announce when each problem set is due in class. I will also give you the “special” problems that are not from the book at that time.

All problems are 10 points, except for those *emphasized*, which are 20.

HW	Ch	Problems
1	1	6.17, 9.10, 10.8, 13.12(a,b), 14.2, 15.28, 15.31, 16.23
2	2	5.45, 7.12, 9.25, 14.14, 17.32
3	3	6.6, 6.30, 7.29, 8.10, 9.23, 11.42, 14.2, 14.11
4	4	1.18, 5.7, 7.23, 9.2, 10.11, 11.3, 11.10, 12.13
5	7	5.5, 7.12, 8.13, 9.1, 13.12
6	8	1.4, 2.16, 3.2, 5.8, 5.35, 6.16, 7.5, 13.34
7	11	<i>Special</i> , 5.1, 11.3, 11.4
8	12	<i>Special</i> , 11.7, 12.9, 15.6, 19.3, 23.10
9	13	<i>4.1 (special)</i> , <i>6.1(a)</i> , <i>6.3</i> , 10.25
10	6	6.13, 8.12, 10.3, 11.2