MATH 307 - Linear Algebra and Differential Equations - Fall 2014

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Office : Keller 312  
Office hours : MTRF 1:30PM-2:30PM or by an appointment  
Course Sections : 002 (three credit hours)  
Class hours : TR 12:00 - 1:15 PM in BIL 335  

Text :  
- Gary L Peterson and James S Sochacki, *Linear Algebra and Differential Equations*

Course Description: Introduction to linear algebra, applications of eigen value techniques to the solution of differential equations. Students may receive credit for only one of Math 307 or 311. Pre: 243 (or concurrent) or 253A (or concurrent), or consent.

Grading: Your final grade will depend on the following:

- Weekly Quizzes (based on Weekly homework) - 30%
- Midterm I - 20%
- Midterm II - 20%
- Final Exam - 30%

A: 90-100%; B: 75-89%; C: 60-74%; D: 40-59%; F: 0-39% ( + & - will be given)

Homework: 
I'll post weekly homework on my website at http://math.hawaii.edu/wordpress/thilanka/teaching-fall-2014/math-307/. **Check the website regularly.** Most of the problems are from textbook. I do not collect homework, but the weekly quizzes are problems from the homework. So doing homework is advisable.

*It is very important that you try all the problems on your own, try hard and take time on a problem before you seek help. The best way to learn is to do! I am always willing to give you hints to a problem, but it is most beneficial to you if you try hard first. You will learn more this way. Also, do more problems from the book to make sure you understand!*
Topics:

• **Matrices and Determinantes**: Systems of linear equations, matrices, matrix operations, inverse matrices, special matrices and their determinantes.

• **Vector Spaces**: Vector spaces, subspaces, spanning sets, linearly independent sets, bases, dimensions, null spaces, row and column spaces, Wronskians.

• **Linear Transformations, Eigenvectors and Values**: Linear transformations, algebra of linear transformations, matrices and linear transformations, similar matrices, singularity and rank, inner products, orthogonality and complements, eigenvectors and values, diagonalization, Jordan normal form.

• **Systems of Differential equations**: Theory of systems of differential equations, higher order ordinary differential equations, homogeneous systems with constant coefficients the diagonalizable case, the nondiagonalizable case, applications to $2 \times 2$ and $3 \times 3$ systems of differential equations.

• **More, as time allows**: Linearization of nonlinear systems and computational stability.

**Course and program objectives**: Linear algebra is one of the basic and foundational topics in mathematics. It is applied in many other fields. The course is intended for non-majors who need to understand the basic principles and apply them in the solution of systems of differential equations.

**Student Learning Outcomes**: A successful student will

- have an understanding of the basic concepts of linear algebra.
- know the principal results in the theory.
- be able to compute examples.
- apply linear algebra to solve problems.
- solve systems of differential equations via eigen value and eigen vector methods.
Resources:

- Me (your instructor): Feel free to stop in during office hours, see me before or after class, or drop me an email.
- The Department of Mathematics Tutor Program, part of the College of Natural Sciences Learning Emporium, is housed in Bilger Addition 209. More details, go to http://www.hawaii.edu/natsci/academic/emporium/
- The Learning Assistance Center in Sinclair Library also provides tutoring for some math classes, including Math 242. Please see their web site at http://manoa.hawaii.edu/learning/tutoring.html

Academic Honesty: No student shall claim or submit the work of another as one’s own. No dishonesty will be tolerated.

Note:

1. **Study of the text book.** One of the goals during this course is to further develop your skills in reading scientific literature. So please be sure to study the text book of every section cover. Be sure to read and understand examples in each section (some examples might be explained in class).

2. **Mutual support.** This is one of the most important values of the classroom. Getting to know each other, working together and helping each other will greatly benefit everyone. Please keep in mind that number of A’s are not limited, there is one for every student who performs well enough. So you will not be competing each other for good grades.

3. **Help.** Seek help immediately if you are having difficulty. Do not hesitate to see me during my office hours. And also use tutoring programs.

4. **Answers.** If you are not sure of your answer, you should devise ways to check it, and check it until you are sure. Simply verifying that your answer agrees with mine, or with the book’s answer, is not sufficient. You must find independent ways to check it. Try to keep in mind that there is no answer book for every problem you may encounter. At some point you have to develop some self-reliance and ways of checking. That point may as well be now!