MATH 379 – SYLLABUS

PEYAM TABRIZIAN

Welcome to Math 379! This is the syllabus for this course, where you can find all the administrative info you need to know, such as office hours and grading. Should you have any other questions, feel free to e-mail me. Enjoy the asymptotic adventure!

- **Instructor:** Peyam (Pie-Am) Ryan Tabrizian
- **E-mail:** tabrizianpeyam@hotmail.com or prt2@williams.edu
- **Office:** 117 Bronfman
- **Class meeting times:** This course meets on MWF from 10 to 10:50 AM in 6 Griffin Hall, from Friday, September 9, up to and including Friday, December 9. I do not take attendance, so whether you show up to class is entirely up to you. That said, attendance is highly recommended, since the homework and exams are directly related to what I cover during lecture.
- **Office Hours: Thursdays from 3:30 pm to 4:30 pm** in 117 Bronfman: This office hour is especially reserved for the students in this class. You are welcome to attend the following other office hours as well, but they might be filled with my Math 200 students: Tuesdays from 3:30 to 4:30 pm, Thursdays from 3 to 3:30 pm, and Fridays from 2 to 3 pm (also in 117 Bronfman). That said, my door is always open for you, even outside the above hours, so if you knock on my door and I'm in, I'd be glad to help!
- **Important Dates:**
  - Friday, September 16: Last day to add/drop classes
  - Some Friday in October: Mountain Day (no classes)
  - Monday, October 10: Fall Reading Period (no classes)
  - Monday, October 24: Last day to drop a 5th class
  - **Friday, October 28: Midterm**

Date: Friday, September 9, 2016.

- Friday, November 18: Last day to withdraw from a course
- Friday, November 18: Last day to change the grading option of eligible courses to P/F
- Wednesday, November 23 – Sunday, November 27: Thanksgiving break (no classes)
- Tuesday, November 29: Last day to claim exam hardship
- Friday, December 9: Last day of class
- **Wednesday, December 14 – Monday, December 19: Final exam–period**

- **Online resources you can use:**

  - sites.williams.edu/prt2: This is the most important resource that you'll need. It contains all homework assignments, as well as information about exams (once we'll get closer to them).
  - www.glow.williams.edu: Use this to check your scores on the homeworks and exams.

- **Textbook:** *Singular Perturbations in the Physical Sciences* by John C. Neu, Graduate Studies in Mathematics (2015) ISBN-13: 978-1470425555, ISBN-10: 1470425556.

  That said, I will not follow the textbook (although sometimes I might reference it), and you do not need it for the homework assignments or the exams.

- **Prerequisites:** Math 350 or 351 or equivalent preparation in analysis. We will not use many of the analysis-concepts per se, but you definitely need the same level of mathematical maturity (this used to be a beginning graduate course at UC Berkeley). You can try taking it without analysis, but it's at your own risk.

- **What people make you believe this course is about:** This will be an applied differential equations course, covering various sort-of rigorous and actually rigorous methods for nonlinear ODE and PDE in interesting asymptotic limits. We will discuss the following topics:

  1. Introduction (nonrigorous)
  2. Asymptotic evaluation of integrals: Laplace's method and stationary phase (rigorous)
  3. Multiple scales (nonrigorous)
  4. Matching methods (nonrigorous)

5. Averaging methods (if time permits; rigorous)
6. Implicit Function Theorem-Methods and Bifurcation Theory (if time permits; rigorous)

- **What this course is *really* about:** As Steve Krantz puts it in his book *How to teach Mathematics,* there is another goal of teaching this course. Namely, *real* purpose of this course is to teach you about *mathematical discourse* and critical thought, especially from the point of view of applied mathematics. Just like in rhetoric, philosophy or politics, mathematics has its own language and way of thinking. What are the methods that an applied mathematician uses to study differential equations? How does he/she guess that the solution has a certain form? What does he/she do when a given method doesn't work? Getting acquainted with all those different types of discourses is what your college education is really about.

  My second goal for you is to offer you a glimpse of the beautiful world of differential equations. My field of research is Partial Differential Equations (PDE), which has a really elegant theory, but which isn't very accessible, unless you've taken high-level analysis (especially functional analysis). You can think of this course as a pre-introduction to PDE, which *is* accessible to people who've taken introductory real analysis (I will be teaching Math 453 this spring, which is an introduction to the theory of PDE)

- **Grading:**

  - 40 % Homework, due on Fridays at 10:50 AM in 6 Griffin Hall.
  - 20 % Midterm, Friday, October 28
  - 40 % Final Exam, TBA, but sometime between Wednesday, December 14 and Monday, December 19.

  I haven't made an official decision yet as to whether the exams will be in-class or take-home, but I will let you know of my decision at least a week in advance of each exam.

  Note: You will be graded on a curve. I will follow the standard grading policies of the math department, but I'll try to be as generous as I can.

- **Homeworks:** Homeworks are due on Fridays at 10:50 AM in 6 Griffin Hall, and usually consist of one or two challenging problems that are

related to what I covered in lecture, so make sure to attend class and definitely don't start the problem set night before. You can find the homework assignments on my website. No late homework is allowed, and no homework scores will be dropped. That said, if you're unable to turn in an assignment due to special circumstances, please let me know; I'll take this into account when assigning grades.

- **Cheating: DON'T!** I *will* catch you, and you will be prosecuted by the full extent of the Williams College law! In particular, by taking this course, you agree to abide by the following honor code:

- **Honor Code:** As a member of the Williams College community, you will act with honesty, integrity, and respect for others. You promise not cheat on the homework and the exams. If you used any outside sources or collaborated with someone on the homework, you will explicitly cite it, and, on the exams, *unless explicitly noted on the first page of the exam*, you will not consult any books (including the textbook) or people (except for me), use notes and/or portable electronic devices. Finally, you promise to take the exam in the allotted timeframe.

- **Accomodations:** Students who may need disability-related accomodations are encouraged to talk to me and the deans as soon as possible. Moreover, according to Williams policy: "Any student who is unable, because of his or her religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such requirement, and shall be provided an opportunity to make up such requirement which s/he may have missed because of such absence now-provided, however, that such makeup examination or work shall not create an unreasonable burden upon the College. No adverse or prejudicial effects shall result to any student."

- **Finally:** Sit back, relax, and enjoy the show! In this course we will explore a vast array of differential equations, so hopefully you'll find one that you'll particularly like :)