Math 318—Spring 2012 Syllabus

Instructor: Rob Manning, `rmanning@haverford.edu`

Office: Hilles 207C (down a half-floor from the main math dept space), 896-1210

Office Hours: W 1:30-3:30 PM, Th 2-4 PM, plus `Gmail-chat` hours W and Th 8:30-9:30 PM, or arrange another time with me.

Texts: "Understanding Analysis", Abbott, (Springer, 2001) and "An Introduction to Lebesgue Integration and Fourier Series", Wilcox & Myers (Dover, 1994)

Homework: Problem sets due Fridays by 3 PM most weeks (give to me in class or leave in drop box outside by office).

Solo Problems: On most HW assignments, there will be one question designated as a "solo problem". No collaboration is allowed on solo problems (while it is encouraged for the other problems—see below). You may ask me for help on solo problems, though I may only give a limited range of advice.

Homework Rewrites: For any HW problem on which you receive a grade of 8/10 or lower, you may submit a rewritten version of the problem, due one week after you get the HW back. If you do, your final grade for the problem will be the average of the original grade and the rewrite grade. Please submit the original problem along with the rewrite. In cases where I post a solution set before the rewrite is due (usually because a test is looming), you should write up your rewrite with the solution set out of sight (although you may have read the solution set already as part of studying for the test).

Tests: There will be two tests during the term and one during finals period. Each test will have two parts: Part I ($\approx$ 90 minutes, self-scheduled, closed-book) covers basic definitions, True/False with short explanation, etc.; Part II (take-home, open-book) typically consists of 4–6 examples and proofs.

Project: Toward the end of the course, you will write a short project (5-8 pages), which will both let you explore some idea related to Math 317 or 318 and also serve as a warmup for a senior thesis. You will begin to pick a topic before spring break, create a proposal/annotated bibliography soon after spring break, submit a first draft a few weeks later, and the final draft near the end of the semester. More specific details, including suggested topics, will be forthcoming. Josh Sabloff will assist with this part of the course, including holding meetings about library/internet tools, conventions of mathematical writing, and the use of LaTeX to produce mathematical documents.

(*Preview of some possible project topics: rigorous definition of* $\mathbb{R}$ *via Dedekind cuts; Baire Category Theorem; results in multivariable differentiation, e.g., Implicit or Inverse Function Theorem; results in multivariable integration, e.g., Fubini or Change-of-Variables Theorem; definition of* e^x *and/or trigonometric functions by series; distributions and* δ*-functions; discrete dynamical systems and chaos; polynomial approximation; calculus of variations; Fourier series; wavelet series*)

Grades:

Homework : 25%
Project: 15%
Tests (3): 20% each

Moodle: All assignments and solution sets (and perhaps some other stuff) will be posted on Moodle.

Collaboration: For homework problems other than solo problems, discussion with other students in the class or with me is encouraged. It is your responsibility to figure out what mode of collaboration works best for you, e.g., do you work on problems by yourself first before talking with a group and/or do you peel away from your group at some point once you've gotten a key idea. **You should work in groups of no more than 4 at a time**; it is my sense that in a group larger than that, some members of the group are not getting the understanding out of the problems that they need to in order to succeed.

You should write up your solutions individually, without using notes from collaborative discussions, so that you can be sure that it represents your personal understanding of the problems. **When you write down a solution to a problem, put away any notes from your collaborative discussions and move away from any blackboard where such notes may be present**. Try to write down the solution based on your understanding of the problem. If you can not do so, then you haven't really understood the solution, so you should throw away your draft and try again (at this point, it is probably smart to ask me for help). I recognize that this process can be burdensome, but it seems to me the only way to be sure that you've understood the key ideas of HW.

For the tests, project, and solo problems, no collaboration is allowed.

Anticipated Schedule:

1/17–1/20	Uniform convergence of a sequence of functions (Abbott, §6.2)
1/23–1/27	Properties of uniform convergence (Abbott, §6.2–6.3)
1/30–2/3	Infinite series of Functions (Abbott, §6.4)
2/6–2/10	Power and Taylor Series (Abbott, §6.5–6.6)
2/13–2/17	Riemann Integration (Abbott, §7.2, 7.3)
	2/17: Test # 1 due (on material 1/17–2/9)
2/20–2/24	Properties of the Riemann Integral (Abbott, §7.4–7.5)
2/27–3/2	Measurable Sets (Wilcox & Myers, Ch. 2)
	Week of 2/27–3/2: Progress Report on Project due
3/5–3/9	**Spring break**
3/12–3/16	Properties of Measurable Sets (Wilcox & Myers, Ch. 3)
3/19–3/23	Properties of measurable sets con't (Wilcox & Myers, Ch. 3)
	3/23: Detailed Proposal/Annotated Bibliography for project due
3/26–3/30	Measurable functions (Wilcox & Myers, Ch. 4)
	3/30: Test # 2 due (on material 2/10–3/21)
4/2–4/6	The Lebesgue Integral (Wilcox & Myers, Ch. 5)
	4/6: First Draft of project due
4/9–4/13	The Lebesgue Integral, con't (Wilcox & Myers, Ch. 5)
4/16–4/20	Convergence & the Lebesgue Integral (Wilcox & Myers, Ch. 6)
4/23–4/27	L^2 spaces (Wilcox & Myers, Ch. 7)
	4/27: Final draft of project due
	Test # 3 due by end of finals period