Exams Fall 2016

Policies

No notes, books or electronic devices on the Midterms or Final Exam.

If you must miss a Midterm or Exam, contact the professors immediately (in advance of the exam) to explain why. Illness and family emergencies are generally acceptable reasons. Job interviews are sometimes an acceptable reason.

Midterm 1 Fall 2016.

Download the solutions.

Median 64.5 out of 75

Approximate letter grade ranges:

- A+: 76-80
- A: 67-75
- A-: 61-66
- B+: 53-60
- B: 40-52

The test will be 80 minutes long, in class on Thursday September 29.

Material: everything covered in class and homework up through "Differentiation through the Integral" (Thursday September 22; see the daily schedule).

Office hours: as usual - Monday 5:00-6:00pm in 243 Altgeld Hall, and Tuesday and Wednesday 3:30-4:30pm in 329 Altgeld Hall (Tyson's office)

Look again at the advice in the handout How to succeed. Especially notice the part about thoroughly understanding every homework problem.

Make summary notes.

Memorize all the definitions - because how can we solve a problem if we don't know what the words mean?! For each definition, you should know one or two illustrative examples.

Learn the statements and hypotheses of all major propositions and theorems.

Study the examples from class.

One of the problems on the test might ask you to reproduce a proof. Here are the proofs you should learn, and practice writing out:

- Proposition 3.5 parts (1), (2), (3) - properties of measures
- Proposition 5.14 - approximation from below by simple functions (including the statement in class that s_n converges uniformly to f on each set where f is bounded)
- Theorem 7.1 - Monotone Convergence Theorem (statement only, no proof)
- Theorem 7.8 - Fatou's Lemma (statement and proof)
- Theorem 7.9 - Dominated Convergence Theorem (learn the statement, and the proof given in class, which differs from the proof in [Bass])

Of course, there are many smaller topics you should learn and understand as well, so don't ignore a topic just because it is not on this list of proofs. Re-read all your lecture notes carefully.

Practice problems on Chapter 7: Exercises 7.5, 7.6, 7.7, 7.9, 7.10, and some of 7.11-7.15 (but not 7.14)

Plan your study schedule today, so that you will have time to learn everything!

Midterm 2 Fall 2016.

Download the solutions.

Median 62 out of 75

Approximate letter grade ranges:

- A+: 74-75
- A: 65-73
- A-: 58-64
The test will be in class on Tuesday November 8, except starting half an hour early (to give extra time): **9:00-10:50am**. The exam will be the same length as Midterm 1.

Material: everything covered in class on Chapters 8, 9, 10, 11, 15, 19 through Thursday November 3 (see the daily schedule) and in related homework.

**Office hours:** as usual, including the collaborative study session on Monday 5-6pm in 243 Altgeld Hall

Look again at the advice in the handout How to succeed. Especially notice the part about thoroughly understanding every homework problem.

Make summary notes.

Memorize all the **definitions** - because how can we solve a problem if we don't know what the words mean?! For each definition, you should know one or two illustrative examples.

Study the **examples** from class. You might be asked on the test to recall an example illustrating a standard definition (e.g. orthonormal sequence of functions in $L^2[0,1]$).

Learn the **statements** of all major propositions and theorems.

Some problems on the test might ask you to reproduce a proof. Here are the proofs you should learn, and practice writing out:

- Proposition 10.2 (convergence a.e. versus convergence in measure)
- Proposition 15.1 (Holder's inequality; give the proof at the level of detail in [Bass])
- Proposition 15.7 part (1)
- **Orthogonal Decomposition Theorem** (step 1 and step 2, not step 3)
- **Bessel's Inequality**

Of course, there are many smaller topics you should learn and understand as well. Re-read all your lecture notes carefully.

**Practice problems on Fourier series:** download file here.

Plan your study schedule today, so that you will have time to learn everything!

**Final Exam Fall 2016.**

The final exam will be Tuesday December 13, 7:00-10:00pm, in our usual classroom.

Material: everything covered in **class** and **homework**.

Roughly 40% of the exam will focus on Chapters 12, 13, 14, and Section 15.4 (that is, the material after Midterm 2), and the rest of the exam will be drawn from the entire course.

**Additional office hours:** Friday December 9, 11:30-12:30 and Tuesday December 13, 10:00-11:00 in Prof. Laugesen's office. Also Monday December 12, 4:00-5:00 in Prof. Tyson's office.

- Look again at the advice in the handout How to succeed. Note some exam problems will be similar to Homework problems.
- Make summary notes.
- Memorize all the **definitions** - because how can we solve a problem if we don't know what the words mean?! For each definition, you should know one or two illustrative examples.
- Study the **examples** from class. You might be asked on the test to recall an example illustrating a standard definition (e.g. find two measures that are mutually singular).
- Know how to do all **homework problems**!

Learn the statements of all major propositions and theorems. A few problems on the exam might ask you to reproduce a proof. Here are the proofs you should learn, and practice writing out:

- Proposition 3.5 parts (1), (2), (3) - properties of measures
- Proposition 5.14 - approximation from below by simple functions (including the statement in class that $s_n$ converges uniformly to $f$ on each set where $f$ is bounded)
- Theorem 7.1 - Monotone Convergence Theorem (statement only, no proof)
- Theorem 7.8 - Fatou's Lemma (statement and proof)
- Theorem 7.9 - Dominated Convergence Theorem (learn the statement, and the proof given in class, which differs from the proof in [Bass])
- Proposition 10.2 (convergence a.e. versus convergence in measure)
- Proposition 15.1 (Holder's inequality; give the proof at the level of detail in [Bass])
- Proposition 15.7 part (1)
- **Orthogonal Decomposition Theorem** (step 1 and step 2, not step 3)
- **Bessel's Inequality**
- Cantor-Lebesgue function (construction, continuity, derivative=0 a.e.; you do not need to prove Holder continuity)
- Proposition 13.2 (quantitative absolute continuity)
Theorem 14.2 (Weak (1,1) inequality)
Theorem 14.5 (FTC part 1 proved using Lebesgue Differentiation Theorem)

Many smaller topics should be learned and understood also. Re-read your lecture notes carefully.

Practice problems:

- Exercise 14.1 (for part (1) use the epsilon-delta characterization of absolute continuity; for part (2), explain why it is valid to use the product rule to evaluate the derivative of fg)
- Exercise 14.5
- Exercise 14.7
- Exercise 14.18

Plan your study schedule today, so that you will have time to learn everything.

Exams Fall 2015