

# Math 4023, Introduction to Modern Analysis

## Course Information

Dr. L. Mantini  
Summer 2012

**Professor:** Dr. Lisa Mantini, 410 Math Sciences, 405-744-5777, mantini@math.okstate.edu, FAX number: 405-744-8275, Web page: <http://www.math.okstate.edu/~mantini/>

**Course Times:** MTWR 10:30–11:45 AM in MSCS 509.

**Email Communication:** You must make sure that your email address in D2L is set to an account that you check *daily!* I will use that address when I need to contact you to find a missing assignment, announce a quiz, or for many other reasons.

**Office Hours:** Mondays and Wednesdays from 1:00–2:30 PM, and by appointment. I am also available immediately after class from 11:45 AM until about 12:15 PM.

**Course Objectives:** The aim of this course is to revisit our study of calculus from a theoretical viewpoint. Our goals are to

- develop a rigorous understanding of function, limits, continuity, and derivatives, to complement the intuition that you gained in your prior courses;
- refine and improve your ability to read and write mathematical proofs and to develop a feeling for why they are so essential in mathematics.

**Prerequisites:** The prerequisites for this course are Calculus I, II, and III (OSU's MATH 2144, 2153, and 2163) and Introduction to Modern Algebra (MATH 3613) or another course in which you have learned to read and write proofs. Anyone without prior experience in the reading and writing of proofs should speak to me after class.

**Text:** The text is *Analysis: With an Introduction to Proof*, fourth edition, by Steven R. Lay. For those with little experience in proof techniques, I recommend *How to Prove It: A Structured Approach* by Daniel Velleman as a supplement for private study.

**Course Requirements:** Students enrolled in this course will complete the following:

- Two **midterm exams** worth 120 points each (20% of your grade), on
  - Thursday, June 21 or Friday, June 22 outside of class (see page 5);
  - Tuesday, July 10 in class.
- **Final exam** worth 150 points (25% of your grade), on Thursday, July 26.
- **Homework** worth 150 points (25% of your grade), collected in 10 assignments worth 15 points each (a few bonus points will be built in).
- **Reading and writing quizzes** done either in class or outside of class, to assess your understanding of the material you read in our textbook and your ability to write clear, concise proofs, worth 60 points (10% of your grade).

Students enrolled in Section 01G for **Graduate Credit**, or students enrolled in Section 001 who wish to earn **Honors Credit**, will also complete:

- One additional homework assignment, worth 15 points;
- Additional problems on the final exam which test the material in the extra assignment, worth 35 points.

**Grading:** The maximum total points for those earning non-honors undergraduate credit is 600. Preliminary grade cutoffs are:

- 537 points (89.5%) guarantees an A in the course;
- 477 points (79.5%) guarantees a B;
- 417 points (69.5%) guarantees a C;
- 357 points (59.5%) guarantees a D.

The maximum total points for those earning honors or graduate credit is 650. Preliminary grade cutoffs are:

- 582 points (89.5%) guarantees an A in the course;
- 517 points (79.5%) guarantees a B;
- 452 points (69.5%) guarantees a C;
- 387 points (59.5%) guarantees a D.

**Homework:** Homework is assigned from every text section we cover, with typically 2 sections of the text on each assignment. Homework will usually be collected on Tuesdays and Thursdays. Selected problems will be graded and the assignment returned as soon as possible. Solutions to all problems on the assignment will be posted on our course's D2L page, typically by 4:00 PM on the due date. Assignments received before 4:00 PM are not considered late. Late homework cannot be accepted once homework solutions are posted. Homework rules:

- Prepare your homework on 8.5" by 11" sheets which are **stapled** and with **no ragged edges**.
- Label each problem with the *complete* problem number, written as 11.5 for problem 5 from section 11, in the **left margin**.
- Write clearly in full, grammatically correct English sentences. Partial credit is not guaranteed.

**Reading Quizzes:** Quizzes on your reading of the text or on other forms of written mathematics will generally be given on Mondays and Wednesdays since written homework will generally be due on Tuesdays and Thursdays.

**Makeup exams:** Makeup exams will be given only for very serious and unavoidable extenuating circumstances. You must notify me as soon as possible after a missed exam.

**Drop Policy:** The last day to drop the course with partial fee refund is Friday, June 8. The last day to drop with an automatic grade of W is Friday, July 13. The last day to withdraw from all classes with an assigned grade of W or F is Friday, July 20.

**Attendance Policy:** Attendance is not a part of your course grade, but it is **very highly recommended**. You are responsible for all material covered in class and all assignments. There is a strong correlation between poor class attendance and low grades. For part of the summer, one of our students will be traveling, so recordings of our class sessions will be available on our D2L page. Those recordings will be available as an extra study tool to all students, but they are not meant to replace class attendance.

**Academic Integrity:** Oklahoma State University is committed to the maintenance of the highest standards of integrity and ethical conduct of its members. This level of ethical behavior and integrity will be maintained in this course. Carefully read the OSU policy at [academicintegrity.okstate.edu](http://academicintegrity.okstate.edu). With regard to the homework in this course, I encourage the formation of study groups and the discussion of homework solutions. However, you must write up your homework solutions and quizzes *yourself*. You must never claim ideas that are not your own as your own. This means that

- Any published or internet source that you consult must be acknowledged.
- Collaborations with other individuals must be acknowledged.
- The words you write must be your own.
- You may not assist another student to cheat by showing them your written homework and you may not consult the written homework of others.

**Study Hints:** This course is difficult but students all over the country succeed in this course every semester, and you can too. Here are some helpful resources:

- Several written sources are meant to help you: the text, the homework hints at the back of the book, and the written solutions I will post on D2L.
- Read the text before the class on that section. Learn to read the text both for the details of proofs or derivations *and* for the big picture.
- Dedicate some pages in your notebook for keeping track of Definitions, Theorems, and Examples. Use examples to help you understand the definitions, the statements of theorems, and their proofs.
- Start homework early and work on it frequently rather than in long, marathon sessions. This gives your brain a chance to have some “Aha!” moments.
- Form a study group, or come to talk to me about the material.
- I will announce times at the MLRC when Andrew Noel, an excellent tutor, will be available to help you.

**Math 4023 Homework List, Summer 2012:** Remember to read the text and answer the practice problems and true-false questions from each section of the text. Problems marked with an asterisk are important enough that they are used later in the text; problems marked with a star have hints or answers in the back of the text.

Prob. Set	Due Date	Sections	Problems assigned
1	6/7	1 2 3	4 c–e, 6, 8, 10 d–h, 12 4, 6 a–c, 8, 10 a–d, 14, 15, 16 3, 4, 6 b, d, g, i, k; 7 c–f; 8, 10
2	6/12	4 5	4, 10, 11, 16, 18, 19, 22 4, 5, 6, 10, 15, 23, 25
3	6/14	6 7, pp. 60–64	8, 10, 11 b, d, f–h; 14, 18, 19 3, 5, 6, 7 (prove (b)), 9, 10
4	6/19	7, pp. 65–71 10	13, 14, 15 a–b, 16 a–b, 19, 22, 26 4, 6, 15, 17, 21
Exam 1	6/21	covers problem sets 1–4	
5	6/26	8	3, 4, 5, 6, 10, 16, 17, 22
6	6/28	11 12	3 b–d, 4, 6, 7, 11 3 (2nd col), 4 (2nd col), 5, 8, 9, 10, 12
7	7/3 (or 7/5?)	13 14	3, 4, 5, 6, 11, 14, 20 a–b, 21 c–e 3, 4, 5, 8, 9
Exam 2	7/10	covers problem sets 5–7	
8	7/17	16 17	3, 6, 7 c–e, 8 a–b, 9, 10, 12, 15 3, 4; 5b, d, f; 6, 7, 15, 18
9	7/19	18 20 21	3 b–d, 4, 5, 10 3 d–h, 6, 7, 9, 16 3, 4, 8, 9, 10, 13
10	7/24	22 25	3 a–b, e–g; 5, 7, 9, 14a 3, 4, 6, 7a, b, d; 9, 11
11 (Hon/Grad credit)	7/26	23 26 29	3a, b, f, g; 4 a–b, 5, 10, 11, 13 4, 5a, c, f; 6, 8b, 9, 17 4, 6, 7, 10, 12
Final Exam	7/26	Comprehensive, emphasizes problem sets 8–10 Includes asn. 11 for Honors or Graduate credit	

**Tentative Calendar:** The following is a tentative calendar for our course. Please note that your instructor will be out of town from July 10–12. In order to compensate for missing **three** class days, we will have some adjustments to our schedule:

- EXAM 1 will be given out of class at one of the following times, if possible, or at other times as needed to accommodate student schedules:
  - Thursday, June 21, 9:00 AM
  - Thursday, June 21, 1:30 PM
  - Friday, June 22, 10:30 AM
- EXAM 2 will be proctored by a substitute teacher. You will be required to bring your student ID to class.
- A lecture class finishing sections 16 and 17 will be conducted outside of normal class times on either July 5th or 6th (or 9th) and pre-recorded on video. You will be responsible for watching that class on video while the instructor is out of town on July 11–12. Students may attend the taping session, if desired, in lieu of watching the video recording.

Week of	Monday	Tuesday	Wednesday	Thursday
June 4	Sec. 1–2	Secs. 2–3	Sec. 4	Sec. 5 <i>Asn 1 Due</i>
June 11	Sec. 6	Secs. 6, 7 <i>Asn 2 Due</i>	Sec. 7	Secs. 7, 10 <i>Asn 3 due</i>
June 18	Secs. 7, 10	Sec. 8 <i>Asn 4 Due</i>	<b>REVIEW</b>	Sec. 8 <b>EXAM 1</b>
June 25	Secs. 8, 11	Secs. 11, 12 <i>Asn 5 Due</i>	Sec. 12	Sec. 13 <i>Asn 6 Due</i>
July 2	Sec. 14	Sec. 16 <i>Asn 7 Due</i>	<b>HOLIDAY</b>	Sec. 17 <i>Video: Secs. 16, 17</i>
July 9	<b>REVIEW</b>	<b>EXAM 2</b>	<b>NO CLASS</b> Watch class	<b>NO CLASS</b> on video
July 16	Sec. 18	Sec. 20 <i>Asn 8 Due</i>	Sec. 21	Sec. 22 <i>Asn 9 Due</i>
July 23	Sec. 25	Secs. 23, 26, 29 <i>Asn 10 Due</i>	<b>REVIEW</b>	<b>FINAL EXAM</b> <i>Asn 11 HG due</i>