Math 301-01 (Introduction to Mathematical Analysis I)

Summer Session II, 2014

Lecture: MoWeTh 1:00 – 3:50pm Sherman 006

Instructor: Dr. Kalman M. Nanes
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Textbook: Robert G. Bartle and Donald R. Sherbert, *Introduction to Real Analysis, Fourth Edition,* Wiley, 2011. As a rough topic order, we will cover Chapters 1 through 6, followed by Chapter 11. I may jump around a bit, skip some things, spend extra time on others, and so on. I will attempt to give you ample notice when my perspective differs from the book.

Additional References:

- S.K. Berberian, A First Course in Real Analysis
- Steven Lay, Introduction to Real Analysis
- Witold Kosmala, Introductory Mathematical Anaylsis
- Carol Schumacher, Chapter Zero
- Strunk and White, The Elements of Style

Grading: The course will be curved **roughly** by the framework:

- A: 90-100%
- B: 80-89%
- C: 65-79%
- D: 55-64%

Your grade will be calculated as follows:

Homework Assignments	25%
Reading Quizzes	10%
Quizzes	20%
Exam	20%
Final Exam	25%

Learning Objectives: This is the first course in which you are expected to apply rigorous mathematical reasoning in solving problems. That is to say, you will be learning to read and write proofs. **You should consider this as much a writing course as a mathematics course.** The mathematical content will deal with mathematical logic and grammar; the construction, algebra, and topology of the real number line; limits of sequences and functions; continuity and differentiability of functions on the real line; and an introductory look at point-set topology.

Attendance and Behavior: **Attendance is crucial to success in this class.** We will be covering new material at a rapid rate, and if you fall behind, it will be very difficult to catch up. **You are responsible for making up any missed material.** I will not accept late homework assignments. **Tardiness counts as lateness.** There will be no make-ups on quizzes. Make-up exams will be given **at my discretion**, in general only in situations where there is a conflict with a **sanctioned university activity** of which I have been notified **at least a week in advance**. Such activities may include things like a course conflict or an athletic event. I will excuse a missed exam due to illness only if I am notified **before the exam**, and only if you furnish a **signed doctor's note** at the earliest available opportunity.

As we are all adults here, I expect us to all act like adults and treat each other professionally. This means that everybody should treat each other with respect in this class. Talking on cell phones, texting, tweeting, playing Starcraft, Warcraft, Minecraft, any other game ending (or not ending) in "Craft", browsing Reddit or Tumblr, and other disruptive behavior is not appropriate for the classroom. Therefore, **there will be a ban on cell phones, laptops, earphones, and other mobile devices in class, except in cases where I have given explicit permission.** Offenders will be asked to leave, and will not get credit for any work handed in that day.

To be clear: you should expect to spend a **minimum** of approximately **15-20 hours per week** on homework and study **outside of class** for this course. **I am not kidding.** This is an average of **3-4 hours per night**. That means that **this course is almost a full-time job**. If you do not take this course seriously from day one, you will simply fail. The time you spend on this course should be roughly equally split between pre-readings and reading quizzes, review of the textbook and course notes, and working on homework and practice problems. If you only work on the problem sets that you hand in as assignments, and never look at the other practice problems, it is very unlikely that you will succeed in this course. This is a hard course. It cannot be crammed for. Good writing takes consistent practice over a long period of time.

Homework: A list of suggested book problems for each section (to be used as practice) will be posted to Blackboard under Course Documents. I will also post problem sets for you to hand in twice a week, of which there will be **10** throughout the term (an 11th will be assigned but not collected). Starred problems will be eligible for board work, and you should do your best to complete these problems to the best of your ability by the draft day; see below. Each homework assignment will be graded out of 25 points. Your lowest two scores will be dropped, as long as you turn in all assignments. Homework assignments that are not turned in will be counted as non-droppable 0's. Your homework score will be weighted as 25% of your overall grade in the course.

Homework expectations are as follows. First, you should view your homework as a professional product. It should be neat, legible, stapled, named, and free of torn notebook edges. You should not type up your homework without explicitly consulting me first. Violation of these rules will result in points being taken off. Secondly, this is largely a writing class. Therefore, part of your grade will depend on the quality of your writing. You should use correct grammar and complete sentences, even when that grammar and those sentences are partially or completely mathematical. You don't need to write **formally** with tortured language and lots of big words; I only expect you to write **clearly**.

I heavily suggest that you form study groups to work on the practice problems and homework assignments. Working with others is the best way to learn mathematics (or really, any subject). Be aware, however, that you do need to complete your own write-ups for homework assignments. If I receive identical write-ups from different people, I will consider that to be plagiarism, and will prosecute you accordingly. To review: discussing concepts and strategies together is fantastic. Checking your work together or arguing your proofs with each other is great. Writing your homework together word-for-word is very bad. In addition, **homework must represent your own efforts**. Getting "help" from sites like Cramster and Chegg will only hinder your ability to do math on your own – not to mention that the solutions on these sites are often wrong. If you must refer to other solutions in order to do your homework, use them as a source of hints and rewrite them in your own words.

Peer Review: Homeworks will be done in two steps. You will begin by bringing in a draft of your current homework assignment. This draft should represent a good-faith effort on the required problems. If you are totally stuck, write out what you have been able to finish so far, and exactly what you don't understand and are stuck on. **You should not be bringing in blank problems.** This draft should follow all rules outlined two paragraphs above, and in addition, should have **a maximum of one question per page, double-spaced**. On days when a draft is due, we will spend some time passing homework assignments around and reviewing each other's work. **You will need a red pen on these days.** Your job will be to determine whether your peers' attempts on the homework problems accomplish what they are supposed to do. You will comment (in red pen) on mistakes and give hints where necessary. Then you will take the comments that have been given to you and rewrite your homework to turn in at the next class period. When you turn in your redrafted homework, the original draft (with peer commentary) should be stapled behind the final draft.

To help you along with peer reviews, I will answer one question in class about each homework problem, time permitting. I will not answer the question itself - I will only talk about related topics.

Peer reviews will be graded on a participation basis. I will be checking to see whether you are putting a good-faith effort on both your rough draft, and your commentary. This participation will count for 20% of your homework grade. The skills that you are learning through writing commentary on homework problems will be tested in quizzes and exams.

Board Work: An important aspect of this course is learning how to assess mathematical writing. On draft days, volunteers will present their work on one of the starred homework problems to the class. Then, the class will analyze the work, determine if it is correct, and help amend it if it is not correct. Board work will be graded based on participation and good-faith effort. Each student will be required to present at least one problem during the term, for 10% of your homework grade. Preference will be given to volunteers who have not yet presented a problem during the term.

Reading Quizzes: As we will be using part of our class time for peer reviews, we need to recoup that time by moving some information exposure outside of the classroom. Therefore, twice a week, you will need to read a couple of sections of material in the text and take a short reading quiz outside of class. This will allow us to spend our lecture time focusing on tricky bits like problem solving and difficult proofs, rather than only on basics like statements of definitions and theorems. Reading quizzes will be handed in at the beginning of class on the days that they are due, and **should not be stapled to homework assignments**. They will each be graded out of 10 points, and will count for 10% of your overall grade. A prospective schedule for material covered on reading quizzes is available below on the Course Calendar. We will adjust this schedule if necessary as we move through the course.

Flash Cards: For highly conceptual math courses, knowing and understanding definitions and theorems as well as possible is crucial. In addition, I will sometimes straight-out ask you to state a definition or a theorem on a quiz or exam. Therefore, you would be wise to create flash cards to help you learn various definitions and theorems. I will provide a suggested list of topics under Course Documents on the course Blackboard site. Flash cards will not be counted in your course grade, but they are a **very** good idea.

Quizzes: There will be two in-class quizzes given during the term: the first on **Monday, July 21st**, and the second on **Wednesday, August 6th**. All quizzes will be closed-book, closed-notes, and will be approximately 45 minutes long. Each quiz will be graded out of 50 points. Your quiz score total will be weighted as 20% of your overall grade.

Exams: There will be one in-class exam given during the term, on **Wednesday, July 30th**. The in-class exam will be open-book, but closed-notes. This means that while you do not need to have each definition and theorem memorized word-for-word, you must be conversant enough with the material that you are able to use the book as a **reference** only, so that you can focus on your writing and proof construction. You won't be successful in your exam if you spend the entire time flipping through your book. The exam will be graded out of 100 points and will be worth 20% of your overall grade. For policies on make-up exams, see the attendance policy, above.

Final Exam: The final exam will be a take-home exam, given out on Wednesday, August 13th. The final exam will be due in class **Thursday, August 14th, at 1:00 pm** (the time of our last class session). After exams have been handed in, we will review solutions for those interested. **I expect all work on the final exam to be your own work.** All rules for homework submissions apply. The final exam will be graded out of 200 points and will be worth 25% of your overall grade. There will be no makeups for the final exam. There will be no extensions on the final exam. Do not make plans to leave campus at the end of the term until after your final exam has been turned in.

Academic Integrity: By enrolling in this course, each student assumes the responsibilities of an active participant in UMBCs scholarly community in which everyones academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include but is not limited to suspension or dismissal. To read the full Student Academic Conduct Policy, consult the UMBC Student Handbook, the Faculty Handbook, or the UMBC Policies section of the UMBC Directory. `http://www.umbc.edu/provost/integrity/faculty.html`

Accommodations: UMBC is committed to eliminating discriminatory obstacles that disadvantage students based on disability. Student Support Services (SSS) is the UMBC department designated to:

- receive and maintain confidential files of disability–related documentation,
- certify eligibility for services,
- determine reasonable accommodations,
- develop with each student plans for the provision of such accommodations, and
- serve as a liaison between faculty members and students regarding disability–related issues.

If you have a disability and want to request accommodations, contact SSS in the Math/Psych Bldg., room 213 or at 410–455–2459. SSS will require you to provide appropriate documentation of disability. If you require accommodations for this class, make an appointment to meet with me to discuss your SSS-approved accommodations.

Class website: Course information (including this syllabus, and homework assignments) will be available at the Blackboard website: `http://my.umbc.edu/go/blackboard`

Course Calendar:

Week 1		
Mon 7/7	Reading Quiz #1 Due (Syllabus)	**Lecture:** 1.1 - 1.2
	Reading Quiz #2 Due (1.1 - 1.2)	
	Read Appendix A (not covered in Reading Quiz)	
Wed 7/9	HW #1 Draft Due (1.1 - 1.2)	**Lecture:** 1.3
	Reading Quiz #3 Due (1.3 - 2.2)	
Thu 7/10	HW #1 Due	**Lecture:** 2.1 - 2.2
Week 2		
Mon 7/14	HW #2 Draft Due (1.3 - 2.2)	**Lecture:** 2.3 - 2.4
	Reading Quiz #4 Due (2.3 - 2.5)	
Wed 7/16	HW #2 Due	**Lecture:** 2.4 - 2.5
Thu 7/17	HW #3 Draft Due (2.3 - 2.5)	**Lecture:** 3.1
	Reading Quiz #5 Due (3.1)	
Week 3		
Mon 7/21	HW #3 Due	**Lecture:** 3.1, continued
	Quiz #1 (Ch. 1, 2)	
	HW #4 Draft Due (3.1)	
Wed 7/23	HW #4 Due	**Lecture:** 3.2 - 3.3
	Reading Quiz #6 Due (3.2 - 3.3)	
Thu 7/24	HW #5 Draft Due (3.2 - 3.3)	**Lecture:** 3.4 - 3.5
	Reading Quiz #7 Due (3.4 - 3.5)	
Week 4		
Mon 7/28	HW #5 Due	**Lecture:** 4.1
	HW #6 Draft Due (3.4 - 3.5)	
	Reading Quiz #8 Due (4.1)	
Wed 7/30	HW #6 Due	**Lecture:** 4.1, continued
	Exam (Ch. 1 - 3)	
Thu 7/31	HW #7 Draft Due (4.1)	**Lecture:** 5.1
	Reading Quiz #9 Due (5.1)	
Week 5		
Mon 8/4	HW #7 Due	**Lecture:** 6.1
	HW #8 Draft Due (5.1)	
	Reading Quiz #10 Due (6.1 - 6.2)	
Wed 8/6	HW #8 Due	**Lecture:** 6.1 - 6.2
	Quiz #2 (4.1, 5.1)	
Thu 8/7	HW #9 Draft Due (6.1 - 6.2)	**Lecture:** 11.1 - 11.2
	Reading Quiz #11 Due (11.1 - 11.2)	
Week 6		
Mon 8/11	HW #9 Due	**Lecture:** 11.3 - 11.4
	HW #10 Draft Due (11.1 - 11.2)	
	Reading Quiz #12 Due (11.3 - 11.4)	
Wed 8/13	HW #10 Due	**Lecture:** 11.3 - 11.4, continued
	Final Exam Handed Out	
Thu 8/14	**Final Exam Due**	