Coleman, Daniel J

From: Stefanov, Atanas
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To: Coleman, Daniel J
Subject: Course syllabus - MA 641

Attached is the course syllabus for mu MA 641 for Spring 26.

Course Syllabus

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Course Instructor: Dr. Atanas Stefanov

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Phone: (205) 934-8551
Office Hours: Friday 11:00-noon, UH 4049

Course Info:
Meeting time: MW 8:00-9:50
Meeting location: UH 4002
Credits: 4 hours.

Textbook: Basic Analysis I, II; by Ji\v r\'i Lebl.

https://www.jirka.org/ra/html/ra.html

Topics to be covered:

1. Sequences of functions - point-wise and uniform convergence. Interchange of limits, Chapter 6.1
2. Integral/derivative of limits, Chapter 6.2
3. Uniform convergence of series of functions (M - test, Dirichlet test), integration and differentiation of series of functions - Chapter 11.2.
4. Differentiation of integrals with respect to parameters, Chapter 9.1

5. Metric spaces - basic properties, examples; open, closed, connected sets. Chapters 7.1, 7.2.
6. Sequences and convergence, completeness and compactness, Chapters 7.3, 7.4.
7. Continuous functions and fixed point theorems, Chapters 7.5, 7.6.
8. Compactness of sets in $C(K)$, the Arzela-Ascoli theorem, Chapter 11.6.
9. Intro to Fourier series - Chapter 11.8.

Important Dates:
First day of classes: January 12.
Spring break: March 9-15.
Last Day of class: April 24.

Class organization: This class will employ a hybrid delivery. Specifically, for every two hours class meetings, the first half will be in the usual lecture format, while during the second half students chosen at random will take turns to present their rigorous solutions to problems from the HW, answer questions from the audience and myself. Non-presenting students are encouraged to participate with ideas and
suggestions for improvements of the arguments/proofs.

Learning outcomes: Upon successful completion of the course, a student

- will be well-versed in the foundational mathematical theory, specifically how the axioms and basic lemmas affect further mathematical explorations.
- can solve problems about sequences of reals in a rigorous way, as modern mathematical thought requires.
- will be able to perform an advanced mathematical analysis in problems involving Riemann integrals, in a way that is appealing for applications.
- will be able to analyze, with advanced methods, situations arising in the theory of power series, including convergence, radius of the convergence, speed of convergence, differentiability/integrability etc.
- Communicate abstract mathematical results to a wider audience.

Exams: There will be one midterm exam and a final exam. If you have a valid reason for missing the exam (essentially medical reasons), you should contact me BEFORE the exam to discuss alternative arrangements. There will be absolutely NO MAKEUP EXAMS! The final exam will be cumulative, i.e. it will test on the entirety of the material.

The exams are scheduled as follows:

Midterm Exam - Monday, March 16th, in class.
Final Exam - Monday, April 27, 8:00 p.m. - 10:30 p.m., UH 4002

Grades:
Your grade for this course will be determined by the number of points that you accumulate. The points will be distributed in the following way:

Presentations & 300 points & 30 %
Midterm Exam & 300 points & 30 %
Final Exam & 400 points & 40 %

A total of 700 points will guarantee an A, 600 a B, 500 a C.

I may, solely at my discretion, lower these thresholds.

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