MATH   5010-201   **Real Analysis**   **Fall 2023**

Class meetings: Monday   6:30 PM – 9:20 PM   **Falmouth 311**
Instructor: **Professor Alexander Kheifets**

Office: **Southwick 350J**   **E-mail:**   alexander_kheifets@uml.edu
URL: https://sites.uml.edu/alexander-kheifets/teaching/

Office Hours: Monday   3:30 – 5:30 p.m.
                     Tuesday   3:30 – 5:30 p.m.   And by appointment

Recommended Texts:
1. Jay Cummings, Real Analysis: *A Long-Form Mathematics Textbook* 2d edition, 2019

2. Walter Rudin, *Principles of Mathematical Analysis.*

Goals of the course: The main goal of this course is deeper penetrating to foundations of Calculus, such as the concepts of limit (of a sequence and of a function) and continuity (including uniform continuity), completeness of real numbers, compactness of sets, Riemann integration. The main emphasis will be the proofs of theorems. I tentatively plan to cover the following topics:

1. Real numbers (algebraic, order and distance structures).
2. Dedekind's axiom
3. Existence of the roots.
4. Lower and upper bounds. Supremum and Infimum. Existence of sup and inf.
5. Archimedean property.
6. Sequences of real numbers and their limits.
7. Monotone sequences.
8. Subsequences and sub-sequential limits, Bolzano-Weierstrass theorem.
9. Limit superior and limit inferior.
10. Cauchy sequences. Completeness.
11. Sequences with infinite limits.
12. Limit of a function.
13. Continuity of a function at a point and on a set.
14. Uniform continuity.
15. Sequences of functions. Pointwise and uniform convergence.
16. Riemann integration.

Homework and Assessment: A problem set will be assigned every class meeting (it will be posted on Blackboard) and it should be submitted in Blackboard by the end of the day of the following meeting. **The written work you turn in must be prepared independently** and represent your own understanding of the problem. However, you are encouraged to discuss with me any questions that you may have when working on the assignments. **Late homework will not be accepted** and may result in loss of points. **Your writing should be neat. If I cannot easily read it, I will not grade it. A clear scan of your work should be uploaded as a single PDF file in the Blackboard.** Your solutions will be graded. **Redoing or extra work by my suggestion only.** There also will be in-class **Quizzes**.

Grading: Final score over 90% translates to A, over 80% to B and over 70% to C.

Academic Integrity
Academic dishonesty is prohibited in all programs of the University and sanctions may be imposed on any student who commits an act of academic dishonesty. Details on UML policy can be found at

https://www.uml.edu/catalog/undergraduate/policies/academic-policies/academic-integrity.aspx and
http://www.uml.edu/Catalog/Graduate/Policies/Academic-Integrity.aspx

Note that any incident which results in some action being taken must be reported to the Provost's Office.