Introduction to Mathematical Reasoning, Fall 2020

Instructor: Dr. Kathleen Hoffman
E-mail: khoffman@umbc.edu
Hours: M 9:30-10am and by appointment

Lectures: MW 9:30-10:45am, Discussion Friday 10-10:50am

- Monday at 9:30am is office hours on Blackboard Collaborate. This is an opportunity for you to get any questions answered.
- Wednesday at 9:30am requires synchronous attendance. Note that Wednesday sessions may be recorded.
- Friday discussion section at 10am requires synchronous attendance.

Past experience in this class has shown that successful students attend class and hand in all homework assignments on time.

- Attendance is expected, will be evaluated using Qwickly in Blackboard, and is worth 5% of your final grade.
- There will be weekly homework assignments over the course of the semester due at 10am on Friday morning by uploading to Blackboard. **No late homework, including completing the modality rubric, will be accepted for any reason.**
- Each Friday, students are expected to synchronously attend discussion and attendance will be taken. During discussion, students will work in groups on a worksheet. Students discuss the solutions to the worksheet problems with their groups, then after discussion, students are expected to each write out their own solution and submit the solution with their homework the following week.
- Lectures will be posted online.
  - Each lecture will be approximately 15 minutes. There will be 4-5 video lectures posted each week.
  - For each video posted, you will be required to take annotated time-stamped written notes on the video and submit the notes on Blackboard **within 48 hours** of the video being posted.
  - Completion points for the notes on the video lectures are worth 5% of your grade. The notes will be graded on a 0, 1, 2 point scale, where 0 means you did not submit notes on time, 1 means that your notes were not sufficient, and 2 means that you received full credit for taking notes on that video assignment.
- Each week there will be a link to a google doc posted on Blackboard. Students are required to post at least one question regarding the material covered during that week. The questions are due Monday at noon and will be part of the weekly grade for taking notes on the video lectures. These questions and the exercises suggested during the video lectures will form the basis of the class on Wednesday.

Grading: Your final grade for the course will be computed as follows:

Homework	20%	Exam1	15 %	Final	20 %
Lecture Notes	10 %	Exam 2	15 %		
Attendance	5 %	Exam 3	15 %		

- You are allowed five missed classes during the semester that will not count toward attendance. If you are absent, you are responsible for the material that you missed during class.
- You will also be allowed to miss two homework assignment and two modality rubric without penalty. Students are still responsible for the contents of all homework assignments.
- You will be allowed to miss five video lecture notes during the course of the semester without penalty.
- Completion points for the weekly modality rubric will be worth one homework grade.
- Completion points for the pre and post exam will count toward one homework grade each.
- In the spirit of academic integrity, I reserve the right to conduct an academic integrity interview after an exam, that is, you may be required to orally explain your exam solutions.

No late homework, including completing the modality rubric, will be accepted for any reason.

Final letter grades will depend on the overall distribution of scores. The cumulative final exam is scheduled for Friday, December 11, 2020, 8am-10am.

LaTeX: This course will utilize LaTeX. LaTeXis type-setting software utilized by the mathematics (and greater STEM community) for cleanly, clearly and efficiently writing and presenting mathematics. It does take some getting used to, and can be frustrating at first, but in the long run it will save you time and energy, and accelerate your transition to mathematical maturity. I will provide templates when possible. Please see the following site to obtain a LaTeXpackage on a personal computer: `https://latex-project.org/ftp.html` or `https://miktex.org`. If you do not want to (or cannot), you can use hosted environments: `https://www.sharelatex.com/` or `https://www.overleaf.com/`.

All homework and exams will be submitted through Blackboard. You are required to use LaTeXto complete the homework assignments. LaTeXwill produce a pdf document that can easily be uploaded to Blackboard. For uploading instructions please see the FAQ. Exams will have to be scanned and uploaded to Blackboard. There are many options for scanning documents. Please find an appropriate scanning app for your phone or tablet and test it well before the exam. For those students who like to write on a tablet, you may import the exam your favorite tablet app, write directly on the tablet, save and export to pdf to upload your solutions.

Suggested Electronic References (listed below) will be on reserve in the library

- ebook: "The Nuts and Bolts of Proofs", 3rd edition
- ebook: for "Introduction to Mathematical Proofs" by Charles Roberts
- ebook: Bridge to Abstract Mathematics; Authors: Oberste-Vorth, Ralph W., Lawrence,Bonita A. and Mouzakitis, Aristides ·
- ebook: Transition to Abstract Mathematics: Learning Mathematical Thinking and Writing; Authors: Randall B.Maddox, pending

Suggested Paper References

- Mathematics A Discrete Introduction by Edward Scheinerman
- Foundations of Higher Mathematics by Fendel and Resek
- The Nuts and Bolts of Proof by Cupillari
- Chapter Zero by Schumacher

Academic Success Center Resources

UMBC's Academic Success Center is a one stop opportunity for academic support. We offer online tutoring, writing assistance, and peer assisted study sessions (SI PASS), and one-to-one meetings to help you be successful.

To sign up for a tutoring appointment, visit: Academic Success Center Tutoring. This short tutorial includes instructions for how to schedule a tutoring appointment. Alternatively, please request Diae Mizou through the tutor request form.

Visit our Online Learning Resources webpage for interactive resources, videos, and tips for online learning.
If you have any questions about tutoring, please email tutoring@umbc.edu.

Modality Rubric

Each week you will be required to submit a modality rubric, in which you rate your performance on homework each week according to the following modalities:

- Mechanical: use of definitions and logical structure; formal manipulation of symbols
- Instantiative: viewing the whole statement/proof as a sum of the comprising parts
- Creative: making appropriate connections between concepts to correctly ascertain the crux of the statement/proof
- Critical: ascertaining the overall truth or falsity of a statement/proof; verifying a sequence of logical steps or producing a viable counter-example
- Latex: correctly typeset mathematical symbols and theorems

followed by a short answer question in which you justify how you rated yourself on each modality. Experience has shown that students who think carefully about their performance related to these modalities tend to do better in the course.

Learning Goals and Objectives: Upon completion of this course, students should be able to:

SLO1 Construct basic proofs of if-then statements about integers and sets.

SLO2 Evaluate the truth or falsity of given statements; defend this decision by providing justifications or counterexamples as appropriate.

SLO3 Manipulate and negate simple and compound mathematical statements using propositional logic and truth tables.

SLO4 Quantify (and negate) precise mathematical statements with proficiency in mathematical statements and propositions.

SLO5 Utilize common proof techniques such as induction, proof by contraposition, and proof by contradiction; recognize the need for these strategies in given problems.

SLO6 Apply skills of mathematical reasoning, as listed above, to topics including functions, probability, number theory, and group theory.

SLO7 Evaluate the validity of a given mathematical argument.

SLO8 Demonstrate correct and precise use of mathematical language.