Math 303 - Introduction to the Concepts of Mathematics, Spring 2024
Course Syllabus

Instructor: Brian Leary
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Office: Learning Resource Center 323K
Office hours: Mon 1-2, Tues 2-3, Wed 6pm-7pm (online), Thurs 10-12, Fri 11-12
The Wednesday evening online office hour will be accessible through Google Meet with the meeting code TechMathLeary. Other office hours will be in person, and I may be available by appointment at additional times.

Class Room/Time: INN-B 314, MWF 10:00-10:50 am
Course website: community.wvu.edu/∼bal0018/math303S24.html (QR Code on next page)

Homework assignments and course announcements will be posted on the website and could be sent via email. Please be sure to check the website regularly, and to regularly check the email address you have on record. You are responsible for any information posted on the course website.

Textbook: *A Transition to Advanced Mathematics, 8th Ed.*, by Smith, Eggen, and St. Andre, Cengage 2015. ISBN: 978-1-285-46326-1.

Catalog Data: MATH 303. Introduction to the Concepts of Mathematics. Credits 3. Elementary logic, basic theory, relations and functions, equivalence relations and decomposition of sets, order relations, and cardinality. Emphasis on learning to prove statements and theorems.
Prerequisite: MATH 156 with a grade of C- or better

Course Objective: This course is designed to introduce students in mathematics to the basic mathematical proof techniques and some of the basic contexts in which these proofs appear in later math courses.

Course Outcomes: Upon successful completion of the course, the student will be able to do the following:

1. Identify and differentiate between proof techniques.
2. Evaluate the validity of proofs.
3. Defend or criticize given proofs.
4. Formulate their own original proofs.
5. Justify individual steps in proofs.
6. Apply the definitions of sets, functions, equivalence and order relations, cardinality, and basic number theory.

Course material: While this course is fundamental in the mathematics curriculum, this also could be considered partially an English writing course and a philosophy course, as we will learn both the value of precision of language and ponder the rules of deductive reasoning that sets mathematics apart from other sciences. Putting these skills together, we will learn to construct valid mathematical proofs, as well as some topics and concepts that we can apply our proof-writing skills to in order to establish rigorous theory.

Topics:

1. Propositional Logic and the Basics of Proof Construction (10 days - Chapter 1)
2. Concepts of Set Theory and the Principle of Mathematical Induction (10 days - Chapter 2)
3. Equivalence Relations, Order Relations, and Modular Arithmetic (6 days - Chapter 3)
4. Functions and Proofs of Injectivity and Surjectivity (7 days - Chapter 4)
5. Cardinality and Beyond the Infinite (5 days - Chapter 5)

Grading: Your final grade will be based on homework, three exams during the semester, and the final exam. Your final course score will be computed as follows:

20% Homework + 20% Exam 1 + 20% Exam 2 + 20% Exam 3 + 20% Final Exam

Typical Letter Grade Cutoffs: A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Homework: Homework assignments will be posted on the course website. There will likely be about 8-10 total assignments, and your lowest homework score will be dropped from grade computation. The homework is the most important part of this class. To be more precise, not knowing how to do the homework is the most important part of this class. At this level, mathematics is learned by trying to solve problems and failing over and over again. Therefore, you should be prepared to spend many hours each week in frustration, finding flaws in your arguments, or simply stuck not knowing what to do next! To that end, every student is expected to write out their own solutions for the homework problems. Any verbatim copying of solutions, either from another student or from a textbook or online resource, is prohibited and is considered plagiarism. However, you are permitted and even encouraged to collaborate with each other, as long as each student writes up a final copy of their solutions on their own.

(QR code for homework assignment locations)

Exams: There will be three exams, tentatively scheduled for Wednesday, February 7; Wednesday, March 6; and Friday, April 5. These will be 50 minute exams taken during the regular lecture time. The final exam time will be set by the university, and is scheduled on Monday, April 29 from 10:00 am to 11:50 am. Make-up exams will only be given to students with excused absences, and such make-up exams must be scheduled within 24 hours of the missed exam.

Class policies:

- Calculators will likely not be useful to you in this class, but their allowance on exams will be considered on an exam by exam basis. You may use any calculator to help you do the homework if you wish, but you should keep in mind that you may be required to solve similar problems without a calculator on the quizzes and exams.
- While class attendance does not directly factor into your grade computation, attendance of each lecture is highly recommended. Regular attendance will tend to lead to better understanding of the course material, which tends to lead to better performance on exams.
- If you believe a problem on a homework assignment or midterm exam has been graded incorrectly, you must notify the instructor of your complaint within 7 days of the date the exam is handed back. If you are unable to retrieve your graded material at the time it is handed back, it is your responsibility to make arrangements with the instructor to retrieve the material at another time.

Getting Help: Always remember: asking for help when you need it is not a sign of weakness, but a sign of strength! Please feel free to attend my office hours or email me if you have questions about the course material. If you are unable to make it to my regularly scheduled office hours, I am willing to make an appointment to meet at another time if possible. Free tutoring is also available through Student Support Services, located in Benedum 130, and the Student Success Center, located in the library on the second floor of LRC. Finally, I would also encourage the formation of study groups, to learn from each other and help each other learn.

Institutional Policies: Students are responsible for reviewing policies on inclusivity, academic integrity, incompletes, sale of course materials, sexual misconduct, adverse weather, as well as student evaluation of instruction, days of special concern/religious holiday statements, and the updated COVID-19 statement. For these detailed policies of West Virginia University, please review:
https://tlcommons.wvu.edu/syllabus-policies-and-statements.