Course Syllabus
Math 3003-01W: Transition to Advanced Mathematics
Spring Semester, 2020
University of West Georgia

Instructor: Dr. David G. Robinson, Hum #221, 678-839-4137
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Office Hours: *MW* 12:30 – 1:30, *F* 10 – 10:50, 12 – 12:50, 3:30 – 4:20

Class Meetings: *MWF* 11 – 11:50 a.m., Boyd #302
These will consist of a combination of lectures, question-and-answer sessions, problem presentations, and general discussions. All reading will be assigned in advance of the meeting thereon.

Text/Resources: Hammack, Richard, Book of Proof, 3rd edition, VA Commonwealth, 2018 (pb), ISBN# 0-989-47212-4 [Also available as a downloadable PDF.]

Prerequisites: (i) Calculus I and Elementary Linear Algebra *or* (ii) Calculus II

Topics: *Sets* (Chs.1, 3): Set notation, set membership, set inclusion, set cardinality, set operations (products, unions, intersections, differences, complements), Venn diagrams, power sets, permutations and combinations, Pascal's triangle, inclusion-exclusion, Russell's paradox
Logic (Ch. 2): Logical propositions, logical operations (negation, conjunction, disjunction, implication), conditional statements, truth tables, logical equivalence, universal and existential quantifiers, symbolic logic, logical arguments, validity vs. soundness
Logical Proofs (Chs.4 – 9): direct proofs, proof by contraposition, proof by contradiction, proof by elimination, proofs of biconditional statements, existence and uniqueness proofs, disproof by counterexample, proofs of set relations
Mathematical Induction (Ch. 10): Proofs and definitions by mathematical induction, well-ordering principle, applications to number theory (division algorithm, prime factorization, arithmetic and geometric sequences, Fibonacci sequence, etc.)
Relations and Functions (Chs.11 – 12, 14): Relations, equivalence relations, equivalence classes, partitions, modular arithmetic, rational numbers, partial orders, least upper and greatest lower bounds, functions, injection, surjection and bijection, composition, inverse functions, permutations, iteration, set cardinality, countable and uncountable sets, Cantor's theorems

General Objectives: Besides developing your understanding of the topics mentioned above, there are some general skills you should improve upon along the way in order to be able to apply what you learn in this course to future courses of study. These include:
- use of mathematical terminology and notation
- mathematical abstraction
- mathematical problem-solving techniques
- mathematical proof techniques
- writing skills – both formal and informal

Evaluation Criteria: Grades on all work will be based upon
- accuracy of information (including calculations and use of notation/terminology)
- depth and breadth of solutions
- logic and clarity of arguments
- neatness and clarity of presentation
- correctness of grammar and spelling
- thoroughness and timeliness of work
- intellectual honesty and creativity
- relative difficulty of the assignment/test

Writing Objectives and Requirements:

This is a Discipline Specific Writing (DSW) course. Like all such courses, it *emphasizes writing as a tool for both learning and communication.* Therefore the writing assignments for this course are divided into two types according as the main objective is either "writing to learn" (WTL) or "writing to communicate" (WTC). The specific assignments are as follows. (See schedule for exact due dates):

WTL

- *Vocabulary Journal entries* (three installments): Precise definitions of the fifteen most significant terms introduced in the readings, exercises and class discussions. These must be written out or typed by you.

WTC

- *Problem solutions/proofs*: creatively and logically solved/proven problems and/or propositions, each neatly and formally written up, using complete sentences, proper mathematical notation and good grammar. (See the text and my handout on *Mathematical Presentations* for more details about formal mathematical writing, including examples of good written solutions/proofs.)
- *Test problems* (definitions/problems/proofs on tests.)

Grades: My scale for converting percentage points to letter grades will be as follows:

89-100 A, *77-88* B, *65-76* C, *50-64* D, *below 50* F

Your final grade will be based on the following distribution of points:

Vocabulary Journal (three sets of five definitions)	15%
Problem sets (three graded sets of fifteen solutions/proofs)	45 %
Test scores (three tests)	30 %
Class participation *	10 %

*Class participation includes *attendance* as well as *preparedness* and *discussion contributions*. Missing more than three class meetings *for any reason* will result in an automatic deduction of 1 point per absence (beyond the third) from the 10 points available.

Important Policies and Reminders:

- Attendance is important! However, should you find for some reason that you must miss a class meeting, you are still responsible for any and all material you may have missed during your absence.
- Cell phones should be turned *off* during class meetings. If you need to make or receive a call/text, please excuse yourself from the class and take care of your business outside the classroom.
- *All work submitted for a grade must be your own work and must be turned in on time to be graded.*
- *Tests must be taken at the prescribed times (see attached schedule), except by prior permission from the instructor, which will only be given under the direst of circumstances (serious illness, e.g.). In order for you to obtain such permission, I must be notified of your "dire circumstances", by e-mail, phone, or otherwise, before the test is over. Otherwise you will receive a score of zero for that test.*
- *All electronic correspondence between student and instructor about matters pertaining to this course should be by way of your UWG e-mail account.*
- I assume you will abide by the *SUWG Honor Code*. So will I! Anyone caught cheating - which means *representing someone else's work as your own* - will receive a grade of zero for that assignment/test.
- Please carefully read the information at the following link, as it contains important material pertaining to your rights and responsibilities in this class: https://www.westga.edu/UWGSyllabusPolicies/

Disabilities Act/Accessibility for the Course: If you are a student who is disabled as defined under the Americans with Disabilities Act and require assistance or support services, please notify me and provide me with a copy of your packet from Student Services. The university will provide you with resources for any audio/visual needs that you may have with the learning management system or course content. Please contact UWG Accessibility Services for more information.