

Course Syllabus
Math 3003-01W: Transition to Advanced Mathematics
Spring Semester, 2019
University of West Georgia

Instructor: Dr. David G. Robinson, Hum #221, 678-839-4137
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Office Hours: *MWF* 10:10 – 10:50 a.m., *MW* 12:10 – 1 p.m.

Class Meetings: *MWF* 11 – 11:50 a.m., Boyd #307
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: Eccles, Peter J., Introduction to Mathematical Reasoning: numbers, sets and functions, Cambridge U. Press, 2007 (pb), ISBN# 0-521-59718-8

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

Topics: *Mathematical Proofs* (Chs.1 – 5): Axiomatic systems, logical propositions, necessary and sufficient conditions, disjunction, conjunction, negation, truth tables, logical implication, conditional statements, logical equivalence, direct proofs, proofs and definitions by mathematical induction, well-ordering principle.
Sets and Functions (Chs.6 – 9): Set notation, set elements, membership, set inclusion, set operations, Venn diagrams, Boolean algebra/logic, power sets, set cardinality, products of sets, functions, binary operations, characteristic functions, injections, surjections and bijections, composition, inverse functions, permutations, iteration.
Foundations of Combinatorics and Number Theory (Chs.10 – 14): Counting principles, finite set systems, pigeonhole principle, inclusion-exclusion principle, binomial coefficients, construction of integers, rational numbers and real numbers, countable and uncountable sets.

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 mathematical notation and 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
- achievement of personal potential
- 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 the assignment schedule for exact due dates):

WTL

- *Vocabulary Journal entries* (three installments): organized (e.g., alphabetical) listing of the definitions of 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 questions* (definitions/problems/proofs on tests.)

Grades: My scale for converting numerical grades (i.e., 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:

<i>Vocabulary Journal entries</i> (three installments)	15 %
<i>Problem sets</i> (three graded sets)	30 %
<i>Test scores</i> (three tests)	40 %
<i>Class participation</i> *	15 %

*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 15 points available.

Important Policies and Electronic Communication Information:

- Attendance is important! However, should you find for some reason that you must miss a class meeting, remember that you are still responsible for any and all material you may have missed during your absence.
- Tests/assignments must be taken/turned in at the prescribed times (see attached schedule) in order to be eligible for any credit. *All work on these tests/assignments must be your own, i.e., no help from anyone, without prior permission from the instructor. Failure to abide by this policy will lead to serious consequences: automatic zero on the assignment in question, possible expulsion from the class, etc.*
- All electronic correspondence between student and instructor about matters pertaining to this course should be by way of your UWG e-mail account. In particular, all replacement documents for this course may be obtained via e-mail from the instructor upon request.