Course Syllabus
Math 3003-01W: Transition to Advanced Mathematics
Spring Semester, 2011
University of West Georgia

Instructor: Dr. David G. Robinson, Hum #221, 678-839-4137
E-Mail: davidr@westga.edu
Office Hours: MWF 11 – 11:50 a.m., 1 - 1:50 p.m.
Math Tutoring Center Hours: TBA

Class Meetings: MW 3:30 – 4:45 p.m., Boyd #304
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.


Prerequisites: Calculus II (Math 2644) or permission of instructor.

Topics: Heuristics (Polya): Identifying known quantities, relationships, conditions and unknowns; distinguishing constants and variables; geometric figures; notation; hypothesis vs. conclusion; restatement, specialization and generalization; solution vs. proof; direct vs. indirect proof; deductive vs. inductive reasoning; analysis vs. synthesis; auxiliary elements; analogy and similarity; symptom; reflection and recapitulation; alternative solutions/proofs

Logic (Johnson, chs. 1 – 2): Arithmetic and geometric progressions; proof by contradiction; proof by contraposition; proof by mathematical induction; well-ordering principle; elementary number theory (ring axioms, division algorithm, Euclid’s algorithm, fundamental theorem of arithmetic, rational numbers, binomial coefficients, Fibonacci numbers); propositions; conjunction, disjunction and negation; logical implication; necessary and sufficient conditions; converse and contrapositive statements; truth tables; syllogisms (subject, predicate, premises, terms, etc.); universal and existential quantifiers; counterexamples

Sets (Johnson, chs. 3, 6): Set notation; set elements; membership, set inclusion; set operations (intersection, union, difference, symmetric difference, complementation, and products of sets); Venn diagrams; laws of set operation (commutative, associative, distributive and idempotent laws, group axioms); Boolean logic; power sets; collections of sets; set partitions and transversals; axiom of choice; set cardinality; countable and uncountable sets

Relations (Johnson, chs. 4 -5): binary relations; equivalence relations and equivalence classes; congruences; construction of rational numbers; partial orders and posets; binary operations; characteristic functions; injections, surjections and bijections; inverse maps; permutations.
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

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 (two installments): complete and organized listing of the definitions of terms introduced in the readings, exercises and class discussions.

WTC
- Problem solutions/proofs: six sets of 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 handout on Mathematical Presentations for more details about formal mathematical writing, including examples of good written solutions/proofs.)
- Exam questions (problems/proofs on final exam.)

Evaluation Procedures:
Your understanding of the subject material and your progress toward the aforementioned objectives will be evaluated on the basis of your written work, as described above, your performance on the final exam, and your class participation (attendance, preparedness and contributions.)

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
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:

- Vocabulary Journal entries (two installments) 10%
- Problem sets (six sets) 60%
- Final Exam score 20%
- Class participation * 10%

*Class participation includes attendance as well as preparedness and discussion contributions. Missing more than three class meetings for any reason may result in a deduction of 1 point per absence (beyond the third) from the 10 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 documents for this course may be downloaded from the UWG website by opening the “files” folder for this course in the “myCOURSES” section of the “myUWG” site.