Syllabus: MTH 311.001 Introduction to Modern Mathematics

Instructor: Dr. Brian Beavers, Associate Professor, Department of Mathematics and Statistics
Email: beaversbd@sfasu.edu
Web Site: http://www2.sfasu.edu/math/people/faculty/beavers.html
Phone: 936.205.1839 (Google Voice), 936.468.6262 (office)
Office: Math Building 334
Office Hours: 9-10:15 am MTWR, or by appointment
Class Meetings and Location: 10:15-12:10 MTWR in Math Building 205

Required Materials:

- Functional computer and internet connection, preferably high-speed
- Plug-ins to run D2L, text editor, and web browser
- No textbook is required. I will provide course notes in D2L and give links to supplemental information on the internet.

Course Description: Introduction to logic, basic properties of sets, relations, functions, one-to-one functions, set equivalence, Cantor's Theorem, countable and uncountable sets. Prerequisite: C or higher in MTH 234.

Learning Objectives: see the departmental syllabus online.

Course Requirements: Your course grade will be calcuated as a weighted average of two proctored tests and a series of assignments that include group projects and individual assignments.

Course Outline (Approximate time spent):

- Logic (12%)
  - Statement forms and truth values
  - Compound statements
  - Truth tables
  - Valid and invalid arguments
  - Quantified statements
- Proof techniques via basic number theory (35%)
  - Proving universally quantified statements
  - Examples and counterexamples
  - Direction conditional proofs
  - Indirect proofs (contrapositive and contradiction)
  - Proof by cases
  - Uniqueness proofs
  - Mathematical induction

- Sets and set proofs (12%)
  - Subsets, proper subsets, equal sets, empty set, power sets
  - Union, intersection, difference, complement, Cartesian product
  - Venn diagrams
  - Disjoint sets, pairwise disjoint collections of sets
- Functions (18%)
  - Subsets, proper subsets, equal sets, empty set, power sets
  - Union, intersection, difference, complement, Cartesian product
  - Venn diagrams
  - Disjoint sets, pairwise disjoint collections of sets
- Relations (18%)
  - Relations and inverses
  - Reflexive, symmetric, and transitive relations
  - Equivalence relations, equivalence classes, and partitions
  - Congruence relations
  - Order relations
- Finite and Infinite Sets (5%)
  - Definition of finite set
  - Countable set, uncountable sets
  - Cardinality
- Other topics (as time permits)

See our D2L course for any updates to this syllabus and an updated list of topics covered, homework assignments, and test dates.

Grading Policy:

Grading Scale

All your work will be graded holistically based on a 5-point scale. The various scores are described below; to summarize, a "passing" score is a 3 or higher and a "failing" score is a 2 or lower. Each score will take execution, communication, and correctness into account. I am using this system so that I can better communicate to you whether you understand the material well enough or not. Your primary goal is to earn a 3 or better on everything in this course. In addition, for any group assignments, participation by each group member will be considered.

Computation of Course Grade:

Your course grade will be determined by your performance on graded work in the the following categories: (1) assignments (both individual and group), (2) a take-home midterm test, and (3) an in-class final test. Your final course grade will be the weighted mean of the following components:

- "Assignments" - 40%. This is the mean of your scores, equally weighted, on the various assignments that I will collect during the course..
- "Test 1" - 30%. This is the score of your midterm test from the grading procedure described below. This will be a take-home test that you will receive during the third week of class and will be due at the beginning of class on Monday, June 24.
- "Test 2" - 30%. This is the score of your final exam from the grading procedure described

below. You must take this exam in class on Friday, July 5.

Score Descriptors

1 or 0	2	3	4	5
Failing ("F")	**Deficient ("D")**	**Average ("C")**	**Good ("B")**	**Oustanding ("A")**
This score means that your mathematics or communication shows serious and fundamental errors. You need to review prerequisite material and the basics of what was being assessed. A zero score is reserved for a blank page, complete nonsense, or a haphazard approach (i.e. one without a reasonable direction/order)	This score means that you show some understanding but the flaws in mathematics or communication are not sufficient to be considered passing.	This score means that you understand the material well enough to pass, but you made several substantial mistakes in mathematics or you communicated poorly.	This score means that you understand the material well, but made minor mistakes in the mathematics or communication.	This score means that your mathematics and communication are flawless or nearly flawless.

Letter Grade Scheme for Means and Conversion to "Standard 10-Point" Scale:

Grade	Range	10-Point Scale
A	4.75-5.00	92.5-100
A-	4.50-4.75	90-92.5
B+	4.25-4.50	87.5-90
B	3.75-4.25	82.5-87.5
B-	3.50-3.75	80-82.5
C+	3.25-3.50	77.5-80
C	2.75-3.25	72.5-77.5
C-	2.50-2.75	70-72.5
D+	2.25-2.50	67.5-70
D	1.75-2.25	62.5-67.5
D-	1.50-1.75	60-62.5
F+	1.25-1.50	57.5-60
F	0.00-1.25	0-57.5

Besides high A and low F grades, the conversion from 5 pt scale to 10 pt scale follows the formula (10pt scale) = (5 pt scale)*10 +45

Scoring of Tests

Each test will be divided up into several questions, each of which will be scored on the 5-point scale. You must score at least a 3 on 70% or more of the questions on the test in order to pass the test. Your score for the exam will be computed as follows: (1) if you get a 3 or higher on fewer than 70% of the problems, then your score will be number that results from converting that percentage to

a 5-point scale value using the formula above. (2) if you get a 3 or higher on at least 70% of the problems, then your score will be the mean of the scores of the questions on the test.

More About Scoring

A score of 5 is assigned for flawless or nearly flawless work. Generally, that means that your work is "well-executed," "well-communicated," and "essentailly correct." The following describe what those mean to me:

Well-Executed

- Applies a strategy that makes sense for the given question.
- Applies appropriate mathematical concepts and processes.
- Does not introduce superfluous material.
- Technology is used appropriately.
- Work is logical and includes a sanity check of the final answer.

Well-Communicated

- Readable: The work stands alone (retains context) and is neat and professional in appearance.
- Organized: Provides a clear logical flow from beginning to end.
- Provides sufficient supporting detail and explanations throughout.
- Work is free from grammatical errors.
- Mathematical composition, terminology, and notation is correct.
- Results and/or conclusions are clearly annotated.

Essentially Correct

- Precision: Performs mathematical operations and derives the correct results.
- Uses an appropriate degree of accuracy.
- Draws correct inferences from graphical or numerical data.
- Any computational or algebraic errors are trivial, isolated, and do not affect the dificulty level of the problem.
- Correct units are used.

Note that certain mistakes by themselves automatically drop you to a 2 or lower becuase they are common but fundamental errors that wreck havoc on the truth of your work or fundamentally change the difficulty level of the task at hand. Also, be sure to think about what your writing communicates to a reader. I grade what you have said, not what you meant to say.

Make-Up, Communication, Academic Dishonesty, and Other Class Policies

- It is your responsibility to be aware of due dates and to have access to a computer and other equipment that can handle the necessary work, and to schedule enough time to complete the assignments.
- Out-of-class assignments can be made-up at the discretion of the instructor. Group out-of-class assignments cannot be made up. Assignments designed as formative in-class work

cannot be made up. Proof presentations cannot be made up. With a valid excuse, I will drop excused assignments that are not permitted to be made up or create a replacement assignment in the spirit of the missed assignment.

- Please don't hesitate to contact me if you have questions. You may call my office, leave a voice mail with my Google Voice number, text my Google Voice number, use chat in D2L, or e-mail me. I will be in D2L during my office hours, or you can schedule a time to meet me in person during the week. My preferred methods of communication are face-to-face and email.
- However, you should hesitate to contact me if the information you are asking about can be found in the syllabus or content in D2L. Check those resources before asking me.
- Do not expect me to respond to communications after 5 pm. I will generally respond to communications during the window of 8-10 am in the morning and 1-5 pm in the afternoon. If you cannot come to my regularly scheduled office hours, you are welcome to ask for an afternoon appointment.
- I may send e-mails to the entire class, so please check your SFA e-mail address and D2L email inbox regularly. Also be sure to check for announcements in D2L.
- It is your responsibility to help make the class a welcoming learning environment. Please be respectful to your classmates, who paid just as much as you for this course. I will do my best to politely enforce this.
- You are expected to participate every day and to contribute substantively to each group project.
- Cheating is a most serious offence, resulting in a grade of 0 on the assignment and being reported to the university. Here are some of the ways I define cheating (academic dishonesty) for the various components of this class. These are examples and not exhaustive lists of what I consider cheating. If you have any question as to what I consider cheating, contact me before you turn in the assignment.. See also the official SFA policy later in the syllabus.
  - Overall: Copying or *paraphrasing* from any source *without citation* or *without permission*
  - Take-Home Midterm: While you will not be directly supervised, I still expect your work to reflect your understanding of the material without outside assistance. Do not speak, email, text, or otherwise communicate with anyone else (including asking in internet forums, question sites, or social media sites, etc.) about the questions on the exam or the content of the course during the window to take the exam. The only resources permitted besides your brain, a calculator, a writing instrument, paper to work on, and the exam itself are your notes from class and material in or directly linked from our course in D2L.
  - In-Class Final: Do not use any materials besides those provided at the test except for your calculator and a writing instrument. Water or drink bottles are permitted at the discretion of the instructor after inspection. You may use any calculator if you want, however I will check any graphing calculator for notes. You may not ask anyone about anything on the test while taking the test.
  - Group projects: Copying or paraphrasing from any other groups or anyone outside the course. Using projects submitted by students who have previously taken the course is also considered academic dishonesty. Only use the resources allowed in the instructions.
  - Assignments: Copying or paraphrasing from other students. Your work should look considerably different from other students in the class. Just changing a few words or symbols counts as cheating. You work should reflect your understanding of the material,

not just responses parroted or cobbled together from others in class or outside class, including the internet. You may work together on some assignments, but if you do so, indicate who you worked with in the assignment. Your should make a deliberate effort to make you work look different from the person you worked with. "We worked together" is not a valid excuse for individual assignments to look the same unless you have explicit permission from me.

- Make sure you have read this entire syllabus carefully because you are responsible for what lies within it. Ignorance of the rules is not an excuse.

Tips For A Successful Math Class:

- Sleep and relax! Well…outside of class, that is. It is hard to do math well with a tired or anxious mind!
- Learn mathematical terminology! It's hard to think and talk about concepts when you don't know what the words mean that we're using. For any math word, be able to give a formal definition, an informal definition, an example that illustrates the concept, and "non-examples" (examples of situations that are close to being right, but not quite).
- Do. The. Homework. All of it. Several times if necessary. Create new problems if you run out of problems to practice.
- Strategize! Take the time to think about how the different types of problems are solved and create a road map in your mind how to get to the solution.
- The quality of the time is as important as the quantity of the time you spend studying. You have to understand the concepts and basic examples before you can master the harder problems. Regularly look back at the big picture when you get stuck on an immediate detail.
- Get help! If you're alert, know the words, and understand the examples but are still stuck, then get help from me or a tutor.
- Learning math is a lot like learning anything else – sports, music, etc. Some have natural talent, some don't. At the beginning, you have to drill those basic moves until you can do them almost without thinking in order to overcome your anxiety. Only then can you concentrate on improving your skills and learning more sophisticated moves. I am your coach; I can't make the moves for you. I can show you the mechanics of the move and explain why the move does what it does, but only you can do it for yourself. You must both practice and reflect on your performance in order to win!
- Find your motivation and hold onto it! It's hard to do well in something you don't want to do, and it's easy to get lost in the drudgery and lose focus. But, math can be very beautiful and enjoyable with a little motivation!

The SFA Way

"…striving for personal excellence in everything that we do."

At Stephen F. Austin State University, our faculty, staff, alumni and students believe in doing things "The SFA Way." We expect the best from ourselves and from each other, and we hold each other accountable when we fail to maintain these standards.

Root Principles

Grounded in the five "Root Principles" below, members of the SFASU community seeks to strive for personal excellence in everything that we do.

The Principle of Respect:

Lumberjacks command respect and treat others with respect • They are considerate of others and tolerant of differences • They demonstrate respect for those around them by avoiding the use of offensive or profane language • They do not threaten or harm anyone and deal peacefully and civilly with conflict.

The Principle of Caring:

Lumberjacks think of the needs of others and seek to improve the quality of life of those around them • They are compassionate, empathic and kind • They respond with humility to those they have helped and express gratitude freely to those who help them • Lumberjacks prepare themselves to become leaders in their communities and workplaces • They dedicate themselves to excellence in their chosen field of study and to using what they learn in the service of others.

The Principle of Responsibility:

Lumberjacks do what is right • They persevere in times of adversity • Through self-control and self-discipline, they strive to do their best • Lumberjacks challenge each other to exceed expectations • They are active learners both inside and outside of the classroom • They are reliable; they do what they say they will do • Lumberjacks hold themselves accountable for their decisions •

The Principle of Unity:

Lumberjacks are loyal to their friends, family, university, state and country • Lumberjacks stand together against any adversary • They recognize that though we are very different from one another, we are united by the Lumberjack Spirit. Lumberjacks seek to understand the people and world around them • When one lumberjack fails, all fail • When one lumberjack succeeds, all succeed.

The Principle of Integrity:

Lumberjacks have the courage to do what is right, even when it is hard or unpopular • They respond to each situation with steadfast values that are not subject to change based on the actions of others • They seek opportunities to practice effective and ethical leadership • Lumberjacks are honest; they do not deceive, cheat or steal • Lumberjacks stand up for those who cannot stand up for themselves • As lifelong learners, lumberjacks are committed to continuously improving themselves.

Academic Integrity (A-9.1): Abiding by university policy on academic integrity is a responsibility of all university faculty and students. Faculty members must promote the components of academic integrity in their instruction, and course syllabi are required to provide information about penalties for cheating and plagiarism as well as the appeal process.

Definition of Academic Dishonesty

Academic dishonesty includes both cheating and plagiarism. Cheating includes, but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) falsification or invention of any information, including citations, on an assignment; and/or, (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism include, but are not limited to: (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from the Internet or another source; and, (3) incorporating the words or ideas of an author into one's paper or presentation without giving the author due credit. Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp.

Withheld Grades *Semester Grades Policy (A-54)***:** Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities: To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Acceptable Student Behavior: Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.