**MTH 311.001—Intro to Modern Mathematics**  
**Department of Mathematics and Statistics**  
**Class Policy Sheet and Syllabus—Fall 2019**

**Professor:**  
Dr. Sarah T. Stovall

**Office:**  
338 Mathematics building

**Email:**  
sstovall@sfasu.edu

**Office Phone:**  
936.468.1684

**Office Hours:**

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
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</thead>
<tbody>
<tr>
<td>1:30-3</td>
<td>11-12</td>
<td>1:30-3</td>
<td>11-12</td>
<td>none</td>
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**Class Times & Place:**  
8:00-8:50 MWF, Room 209 Math building

**Course description:**  
This is a transition course which should serve as a bridge between computational courses such as calculus, and more theoretical courses. The student will be introduced to the formulation and writing of rigorous mathematical proofs. Topics include an introduction to logic, basic strategies for mathematical proofs, properties of sets, relations, functions, one-to-one functions, set equivalence, countable and uncountable sets.

**Text and Materials:**  

**Course Calendar:** Please note that the dates for our in-class exams below are subject to change. The final is university scheduled and cannot be taken at a different time without permission of the Chair of the Department of Mathematics and Statistics.

- **Exam 1** Friday, September 20
- **Exam 2** Friday, October 18
- **Exam 3** Friday, November 15
- **Final** Wednesday, December 11, 8-10:30 in our regular classroom

**Grading Policy:**

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>60%</td>
<td>First Three Exams (top two 22% each, lowest 16%)</td>
</tr>
<tr>
<td>10%</td>
<td>Homework quizzes</td>
</tr>
<tr>
<td>30%</td>
<td>Comprehensive Final Exam</td>
</tr>
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**Grading Scale:**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90% - 100%</td>
</tr>
<tr>
<td>B</td>
<td>80% - 90%</td>
</tr>
<tr>
<td>C</td>
<td>70% - 80%</td>
</tr>
<tr>
<td>D</td>
<td>60% - 70%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
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</tbody>
</table>

**Course Requirements:**

- **Three in-class exams**—If a student must miss an exam due to an excused absence, special arrangements should be made in advance. **Cell phones and graphing calculators are not allowed out during exams, even if that is all you brought.** No music (even through headphones) is allowed during exams.

- **Homework/definition quizzes**—Homework will be assigned and short quizzes on homework problems will be given on many non-exam days. Completing homework and checking your answers to problems with solutions is your source for daily feedback. Completing homework is also how you identify which topics on which you need to spend more time. To emphasize the importance of using definition in proof, some days we will have definition quizzes. It is never my intention to surprise you. Ask me what to expect.

- **A comprehensive final exam**—The final exam is **Wednesday, December 11, 8-10:30 in our regular classroom.**

- **Class attendance and participation**—Students are expected to attend all class meetings, arriving on time. **Bring your text daily.** If you are absent, you are responsible for determining what you missed and for being prepared for class when you return. Students should be prepared to invest several hours per day outside of class reading the text, practicing examples, and working homework exercises. **Material to be discussed in class should be read before coming to class.**

- **Email**—Check your university email regularly, as I may send reminders, assignments, or announcements via your @jacks account.

**Notes to the Student:** MTH 311 is a bridge course to higher level mathematics. This course is the course in which you learn that there is no way to learn mathematics without practice, practice, practice. We practice examples in class, and you’ll try out your proof wings on your own in the homework. Be sure that you can make a solo flight by the time of the exam. Your grade is composed solely of your homework/quiz average and your exam grades. There is no extra or alternative credit. **Please don’t wait until the end of the semester if you need help. By that time, it’s too late.**

You are responsible for reading the entire course policy sheet and syllabus which can be found online in your MTH 311 course in d2l.
SFASU Policy 5.4: The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;

2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend at least two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

MTH 311 Syllabus: Approximate time spent

- Logic 20%
- Mathematical Proof Techniques 30%
- Set Theory 20%
- Functions 10%
- Relations 10%
- Finite and Infinite Sets 10%

Homework Schedule

<table>
<thead>
<tr>
<th>Topics</th>
<th>Intro to Abstract Mathematics, Bond and Keane</th>
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</thead>
<tbody>
<tr>
<td>1.1 Statements</td>
<td>1, 2abcefg, 3be, 4abcf, 6, 10, D3</td>
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<tr>
<td>1.2 Compound Statements</td>
<td>1, 2, 3, 6, 10, 15, 16</td>
</tr>
<tr>
<td>1.3 Implications</td>
<td>3, 12, 14, 17</td>
</tr>
<tr>
<td>1.4 Contrapositive and Converse</td>
<td>2, 4, 6, 16, 21</td>
</tr>
<tr>
<td>2.1 Sets and Subsets</td>
<td>1befgi, 2bdg, 3a, 8bd, 10, 16, 19bd, 20cde</td>
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<tr>
<td>2.2 Combining Sets</td>
<td>1abdeh, 4bce, 5be, 15, 22, 25, 27</td>
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<tr>
<td>2.3 Collections of Sets</td>
<td>1, 3, 5, 7, 8, 9, 13, 20</td>
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<tr>
<td>3.1 Definition and Basic Properties</td>
<td>3acfgh, 5, 15, 17, 19, 20</td>
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<tr>
<td>3.2 Surjective and Injective Functions</td>
<td>2cd, 3, 8, 12ab, 16</td>
</tr>
<tr>
<td>3.3 Composition and Invertible Functions</td>
<td>1b, 2b, 7, 12, 14, 17</td>
</tr>
<tr>
<td>4.1 Binary Operations</td>
<td>1, 2cd, 3, 6, 9, 17, 29, 33</td>
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<tr>
<td>4.2 Equivalence Relations</td>
<td>1, 3ab, 4ac, 6, 10, 11, 12</td>
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<tr>
<td>5.2 Induction</td>
<td>1c, 2a, 11, 13, 16bc</td>
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<tr>
<td>*5.3 Division Algorithm and GCD</td>
<td></td>
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<tr>
<td>*5.4 Primes and Unique Factorization</td>
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<tr>
<td>*5.5 Congruences</td>
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<tr>
<td>6.1 Countable Sets</td>
<td>2, 4, 6af</td>
</tr>
<tr>
<td>6.2 Uncountable Sets, Cantor’s Theorem &amp; S-B Theorem</td>
<td>1, 5ac</td>
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</tbody>
</table>

*time permitting
Academic Integrity
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

Definition of Academic Dishonesty (SFA policy 4.1):
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) the falsification or invention of any information, including citations, on an assigned exercise; 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 are (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 obtained otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Withheld Grades Semester Grades (SFA Policy 5.5)
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 10.4). 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.

Student Learning Outcomes (SLO): At the end of MTH 311, a student who has studied and learned the material should be able to:
1. Read and interpret written mathematics and communicate their reasoning both orally and in written form. [PLO: S, 3, 5]
2. Translate between symbolic logic notation and standard English. [PLO: S, 3, 5]
3. Understand and interpret compound statements, logical arguments, and fallacies. [PLO: 3]
4. Make appropriate inferences based on conditional and biconditional statements. [PLO: 3]
5. Understand the role of quantifiers in mathematical statements. [PLO: 3]
6. Formulate reasonable conjectures and construct rigorous, well written proofs using a variety of proof techniques (including direct and indirect proofs). [PLO: 1, 3, 5]
7. Construct appropriate counterexamples to disprove statements. [PLO: 3, 4]
8. Understand the principle of mathematical induction and use it in the formulation of mathematical proofs. [PLO: 2, 3]
9. State and use important definitions in set theory. [PLO: 1, 2, 3, 4]
10. Understand and construct proofs concerning subsets and set equality. [PLO: 2, 3, 4]
11. Recognize and prove theorems about equivalence relations, including congruence relations on the set of integers. [PLO: 1, 2, 3, 4]
12. Understand the notion of function and be able to state and use definitions of one-to-one, onto, image and pre-image. [PLO: 1, 2, 3, 4]
13. Understand the notions of infinite set and cardinality and use them to prove that given sets have the same cardinality. [PLO: 1, 2, 3, 4]
14. Understand a proof of the uncountability of the set of real numbers. [PLO: 2, 3]
15. Apply their understanding of logic and proof in an appropriate mathematical context which may include number theory, graph theory, topology, analysis, algebra or other relevant topics. [PLO: 1, 2, 3, 4]

Program Learning Outcomes (PLO): Students graduating from SFASU with a B.S. Degree and a major in mathematics will:
1. Demonstrate comprehension of core mathematical concepts. [Concepts]
   (notion of theorem, mathematical proof, logical argument)
2. Execute mathematical procedures accurately, appropriately, and efficiently. [Skills]
   (calculus, algebra, routine, nonroutine, applied)
3. Apply principles of logic to develop and analyze conjectures and proofs. [Logical Reasoning]
   (quantifiers, breaking down mathematical statements, counterexamples)
4. Demonstrate competence in using various mathematical tools, including technology, to formulate, represent, and solve problems. [Problem Solving]
   (calculus tools, algebra tools, applied tools, nonstandard problem solving)
5. Demonstrate proficiency in communicating mathematics in a format appropriate to expected audiences. [Communication]
   (written, visual, oral)

COMPLETE COURSE POLICY SHEET ACCESSIBLE ONLINE IN D2L.