MATH 3360.001, Introduction to Modern Mathematics
Department of Mathematics and Statistics
Class Policy Sheet and Syllabus—Fall 2021

Professor: Dr. Brittney Falahola
Office: 324 Mathematics Building
Email: falaholabl@sfasu.edu
Office Phone: 936.468.1772

Office Hours: This semester, office hours will be held face-to-face or via Zoom. For the times in the table below, no appointment is needed; simply attend by showing up to my office or clicking the link on D2L as your schedule allows. In addition, individual appointments at other times may also be scheduled by emailing me in advance.

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-11am</td>
<td>1:30-3pm</td>
<td>10-11am</td>
<td>1:30-3pm</td>
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</tbody>
</table>

Course description: Introduction to logic, basic properties of sets, relations, functions, one-to-one functions, set equivalence, Cantor’s Theorem, countable and uncountable sets.


Course Calendar: Please note that the dates for our midterm exams below are subject to change. The final is university-scheduled and cannot be taken at a different time without permission of the Dean of the College of Sciences and Mathematics.

- Exam 1 Friday, September 17
- Exam 2 Friday, October 15
- Exam 3 Friday, November 12
- Final Wednesday, December 8, 8:00 – 10:00am

Course Requirements:
- **Three midterm exams and a final exam**—We will have three midterm exams and a final exam on the dates listed above. The three midterms will each be taken in a two-hour time block scheduled outside of class. The reason for the two-hour exams is to reduce pressure and eliminate time constraints. I will talk more about scheduling these exams as the first exam approaches. If a student must miss an exam due to an excused absence, special arrangements should be made at least one week in advance when possible. The final will be comprehensive. No music (even through headphones) is allowed during exams.

- **Homework**—Exercises will be assigned daily from the text and collected. Completing the homework is crucial for success in the course. See the section below for more details.

- **Class attendance, participation, and presentations**—Students are expected to attend all class meetings, arriving on time and actively participating in class discussions. You should also expect to give presentations in class on homework problems and/or textbook material. See the section below on presentations and participation to see how they will be assessed.

  If you are absent, you are responsible for determining what you missed and for being prepared for class when you return.

- **Preparing for class**—Students should be prepared to invest several hours per day outside of class reading the text, watching screencasts, practicing examples, and working homework exercises. *Material to be discussed in class should be read before coming to class.* Check your university email regularly, as I may send reminders, assignments, or announcements.

Grading Policy: 50% Three Midterm Exams (highest 20%, others 15% each) 20% Daily and Biweekly Homework 10% In-Class Participation and Presentations 20% Comprehensive Final Exam

Grading Scale: 90% - 100%: A 80% - 90%: B 70% - 80%: C 60% - 70%: D Below 60%: F
Homework

General Comments
You are allowed and encouraged to work together on homework, but each student is expected to turn in his or her own work. Be aware also that consulting the Internet for solutions is considered cheating (you may look up definitions online, but steer clear of viewing solutions to the assigned exercises).

In general, late homework will not be accepted. However, you are allowed to turn in three late daily homework assignments with no questions asked (please note that this allowance does not apply to biweekly homework). Unless you have made arrangements in advance with me, homework turned in after class will be considered late. Your overall homework grade will be worth 20% of your final grade, and will consist of daily homework and biweekly homework. On each homework assignment, please write/type (i) your name, (ii) name of course, (iii) Section(s) covered in that assignment, and (iv) due date.

Daily Homework
Homework will be assigned each class meeting, and students are expected to complete (or try their best to complete) each assignment before walking into the next class period. All assignments should be carefully, clearly, and cleanly written. Among other things, this means your work should include proper grammar, punctuation, and spelling. You should write a draft of a given solution before you write down the final argument, so do yourself a favor and get in the habit of differentiating your scratch work from your submitted assignment (by getting a separate notebook just for scratch work, for example).

The Daily Homework will generally consist of completing exercises and proving theorems from the textbook. On the day that a homework assignment is due, most of the class period will be devoted to students presenting some subset (maybe all) of the proofs/solutions that are due that day. There are two parts to each Daily Homework assignment, as outlined below.

Part 1: Prior to the start of class, you will need to capture your handwritten work digitally and then upload a PDF to D2L. There are many free smartphone apps for doing this. I use AdobeScan on my Android. Submitting your work prior to class allows me to see what you accomplished outside of class. Part 1 will be assessed using the following rubric.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Sufficient effort was put into nearly all the problems.</td>
</tr>
<tr>
<td>2</td>
<td>Some problems were omitted and/or sufficient effort was not exhibited.</td>
</tr>
<tr>
<td>1</td>
<td>Many problems omitted and/or minimal effort exhibited.</td>
</tr>
<tr>
<td>0</td>
<td>Assignment was not turned in.</td>
</tr>
</tbody>
</table>

Part 2: During class, we will discuss most of the problems that are due that day. While we are discussing them, you should either annotate your work and/or take notes on separate paper. It’s expected that most of the work you did prior to class will need to be refined. It is your responsibility to process this in some way. Annotating your work or taking notes will increase the chances that you are processing the work in a meaningful way. If you choose to annotate your work, please use a different color than what you originally used to complete your assignment. After class, you will need to capture your annotations/notes digitally and then upload a PDF to D2L. Part 2 will be assessed using the following rubric.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Student annotated their work in a meaningful way and/or took sufficient notes.</td>
</tr>
<tr>
<td>1</td>
<td>Student annotated their work and/or took notes but effort and/or attention to detail was insufficient.</td>
</tr>
<tr>
<td>0</td>
<td>Student did not submit this portion of the assignment.</td>
</tr>
</tbody>
</table>

1 The wording from the next Homework and Presentations sections is from Dana Ernst of Northern Arizona University, and he credits Carol Schumacher for parts of the wording as well.
**Biweekly Homework**

In addition to daily homework sets, I will also assign biweekly homework assignments that should be carefully written up for grading. These homework assignments will consist of about four to six formally written proofs. Many of the problems will be taken from the daily homework assignments, but there may be some new problems as well. *The idea is to refine the ideas you developed in completing your daily homework assignments and discussing them in class to develop a well-written formal proof.* By the end of the semester, these biweekly homework assignments can be viewed as a proof portfolio that you can take on to other proof classes. The proofs in each biweekly homework assignment will be graded using the 0-8 scale shown below.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>8</td>
<td>This is correct and well-written mathematics!</td>
</tr>
<tr>
<td>6</td>
<td>This is a good piece of work, yet there are some mathematical errors or some writing errors that need addressing.</td>
</tr>
<tr>
<td>4</td>
<td>There is some good intuition here, but there is at least one serious flaw.</td>
</tr>
<tr>
<td>2</td>
<td>I don't understand this, but I see that you have worked on it; come see me!</td>
</tr>
<tr>
<td>0</td>
<td>I believe that you have not worked on this problem enough or you didn't submit any work.</td>
</tr>
</tbody>
</table>

**Presentations and Participation**

**General Comments**

The problems chosen for presentations will come from the homework assignments and/or the textbook. Though the atmosphere in this class should be informal and friendly, what we do in the class is serious business. In particular, the presentations made by students are to be taken seriously since they spearhead the work of the class. Here are some of my expectations for the presenter:

- The purpose of class presentations is not to prove to me that the presenter has done the problem. It is to make the ideas of the solution clear to the other students.
- Presenters should explain their reasoning as they go along, not simply write everything down and then turn to explain.
- Fellow students are allowed to ask questions at any point and it is the responsibility of the person making the presentation to answer those questions to the best of his or her ability.
- Since the presentation is directed at the students, the presenter should frequently make eye-contact with the students in order to address questions when they arise and also be able to see how well the other students are following the presentation.

**Assessing Presentations**

Presentations will be assessed using the following criteria.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>U</td>
<td><strong>Unsatisfactory.</strong> Minimal progress was made that included relevant information or the student was unprepared.</td>
</tr>
<tr>
<td>I</td>
<td><strong>In progress.</strong> The student made an honest attempt at the problem but recognized a flaw that prevented them from being able to complete the problem during the presentation. Alternatively, the student reported on their current progress on a problem and attempted to convey where or why they are currently &quot;stuck.&quot;</td>
</tr>
<tr>
<td>M</td>
<td><strong>Meets Expectations.</strong> The student demonstrated an understanding of the problem and presented the key ideas. Perhaps some details were omitted or interesting mistakes were made. The presentation led to fruitful class discussion.</td>
</tr>
<tr>
<td>E</td>
<td><strong>Exceeds Expectations.</strong> The presentation was flawless and the student demonstrated keen insight into the problem. The presentation led to fruitful class discussion.</td>
</tr>
</tbody>
</table>
You should aim to avoid unsatisfactory (U) presentations. An in-progress (I) presentation should not be viewed as a bad thing as each of us will occasionally get stuck. However, you should strive for the majority of your presentations to meet (M) or exceed (E) expectations. Most presentations will meet expectations (M) while presentations that exceed expectations (E) will be rare. You should not let the rubric deter you from presenting if you have an idea about a solution/proof that you’d like to present but are worried that your solution/proof is incomplete or you are not confident your solution/proof is correct. You will be rewarded for being courageous and sharing your creative ideas! In my view, an interestingly wrong solution or proof makes for the best presentation since it generates the best discussion. This is really what we are after. On the other hand, you should not present unless you have spent time thinking about the problem and have something meaningful to contribute. I will provide a progress report concerning each student’s presentation history at the end of each month.

Selecting Presenters
In general, I will curate the list of student presenters each class meeting. A presenter is a student that either volunteered (V) or was chosen (C) by me. Volunteering is encouraged, but being chosen without volunteering isn’t bad. If more than one student volunteers for a specific problem, the student with the fewest number of presentations has priority. I reserve the right to decline your offer to present. This may happen if you are volunteering too often (and hence removing another student’s opportunity to present) or if I know in advance that another student’s presentation will lead to a fruitful discussion.

If you are chosen to present but would prefer not to present that particular problem, you can either negotiate presenting a different problem or take a pass (P). You may elect to pass at most three times during the semester, after which a presentation will be deemed unsatisfactory (U). By default, if you have an unexcused absence on a day when you have been chosen to present, then your presentation will be recorded as a pass (P) unless you have already exhausted your three passes, in which case the presentation will be recorded as unsatisfactory (U).

<table>
<thead>
<tr>
<th>Specification</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Volunteered. Student volunteered during class or in advance to present.</td>
</tr>
<tr>
<td>C</td>
<td>Chosen. Student was selected by the instructor and agreed to present.</td>
</tr>
<tr>
<td>P</td>
<td>Pass. Student was selected to present, but asked to take a pass. Allowed at most three.</td>
</tr>
</tbody>
</table>

In summary, for each student presentation, I will record one of V, C, or P. In the case of V or C, I will also record one of U, I, M, or E based on the rubric given above. The most common pair will likely be CM (i.e., student was chosen to present and presentation met expectations).

Participation
You are expected to respectfully participate and contribute to class discussions. This includes asking relevant and meaningful questions to both the instructor and your peers. Moreover, you are expected to be engaged and respectful during another student’s presentation. Your class participation will be assessed as follows.

<table>
<thead>
<tr>
<th>Specification</th>
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</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>Unsatisfactory. Student was often disengaged or disrespectful. Alternatively, the student regularly missed class.</td>
</tr>
<tr>
<td>M</td>
<td>Meets Expectations. Student was consistently respectful, engaged, and contributed to meaningful class discussions. In addition, the student regularly attends class.</td>
</tr>
<tr>
<td>E</td>
<td>Exceeds Expectations. Student’s presence in the classroom truly enhances the learning environment.</td>
</tr>
</tbody>
</table>

Determining Presentation and Participation Grades
Your Presentation and Participation grade is determined by your frequency and ability to foster productive class discussions through presentations and audience participation. The greatest determining factor in your Presentation and Participation grade is your willingness to present often. You should aim to present at least three times prior to each midterm exam. The table below provides a summary of how your Presentation and Participation grade will be determined.
Grade Range | Criteria
--- | ---
90-100% | Student receives M or E for participation. Student averages at least 3 presentations every four weeks. Student often volunteers to present and some of these problems are challenging. Most presentations receive M or E.
80-89% | Student receives M or E for participation. Student averages at least 2 presentations every four weeks. Student occasionally volunteers to present. Most presentations receive M.
70-79% | Student receives M for participation. Student averages less than 2 presentations every four weeks. Student rarely volunteers to present and actively avoids presenting challenging problems. Some presentations receive U.
60-69% | Student receives U for participation. Student rarely presents and actively avoids presenting challenging problems. Some presentations receive U.
Below 60% | Student receives U for participation. Student rarely or never presents and has completely disengaged from the class community.

**Course Outline**

<table>
<thead>
<tr>
<th>Approximate Time Spent</th>
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</thead>
<tbody>
<tr>
<td>Logic</td>
</tr>
<tr>
<td>Mathematical Proof Techniques</td>
</tr>
<tr>
<td>Set Theory</td>
</tr>
<tr>
<td>Functions</td>
</tr>
<tr>
<td>Relations</td>
</tr>
<tr>
<td>Finite and Infinite Sets</td>
</tr>
<tr>
<td>Other topics (as time permits)</td>
</tr>
</tbody>
</table>

See [http://www3.sfasu.edu/math/docs/syllabi/MATH3360Syllabus.pdf](http://www3.sfasu.edu/math/docs/syllabi/MATH3360Syllabus.pdf) for elements common to every section of MATH 3360, including the associated student and program learning outcomes for this course.

**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 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.

Please read the complete policy at [http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf](http://www.sfasu.edu/policies/student-academic-dishonesty-4.1.pdf)

**Withheld Grades Semester Grades Policy (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 D-34.1 http://www.sfasu.edu/policies/student-code-of-conduct-10.4.pdf). 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.

Importance of Mental Health
SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

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Note on Credit Hours
**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.

**Disclaimer:** I, Dr. Falahola, reserve the right to make changes to any part of this syllabus in the interest of the class. Students will be notified of any changes via email and in person.
Math 3360–Introduction to Modern Mathematics
Course Syllabus

Course description: Introduction to logic, basic properties of sets, relations, functions, one-to-one functions, set equivalence, Cantor’s Theorem, countable and uncountable sets.

Credit hours: 3

The following is an excerpt from SFA 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:

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Course Prerequisites and Corequisites: MATH 2314 and MATH 2314L

Course outline:

- **Logic**
  - Statements and truth values
  - Compound statements
  - Truth tables
  - Valid and invalid arguments
  - Quantified statements
  - Approximate time spent 20%

- **Mathematical Proof Techniques**
  - Proving universally quantified statements
  - Examples and counterexamples
  - Direct conditional proofs
  - Indirect proofs (contrapositive and contradiction)
  - Proof by cases
  - Uniqueness proofs
  - Mathematical induction
  - Approximate time spent 30%

- **Set Theory**
  - Subsets, proper subsets, equal sets, empty set, power sets
  - Union, intersection, difference, complement, Cartesian product
  - Venn diagrams
  - Disjoint sets, pairwise disjoint collections of sets
  - Approximate time spent 20%

- **Functions**
  - Definition of function, domain, codomain, range
  - Images, pre-images
  - Approximate time spent 10%
• One-to-one functions, surjections, bijections
• Composite functions

• Relations 10%
  o Relations and inverses
  o Reflexive, symmetric, and transitive relations
  o Equivalence relations, equivalence classes, and partitions
  o Congruence relations
  o Order relations

• Finite and Infinite Sets 10%
  o Definition of finite set
  o Countable set, uncountable sets
  o Cardinality

• Other topics (as time permits)

Student Learning Outcomes (SLO): At the end of MATH 3360, 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: 1,2,3]
2. Translate between symbolic logic notation and standard English. [PLO: 1,2,3]
3. Understand and interpret compound statements, logical arguments, and fallacies. [PLO: 1,2,3]
4. Make appropriate inferences based on conditional and biconditional statements. [PLO: 1,2,3]
5. Understand the role of quantifiers in mathematical statements. [PLO: 1,2,3]
6. Formulate reasonable conjectures and construct rigorous, well written proofs using a variety of proof techniques (including direct and indirect proofs). [PLO: 1,2,3]
7. Construct appropriate counterexamples to disprove statements. [PLO: 1,2,3]
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]
10. Understand and construct proofs concerning subsets and set equality. [PLO: 1,2,3]
11. Recognize and prove theorems about equivalence relations, including congruence relations on the set of integers. [PLO: 1,2,3]
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]
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]
14. Understand a proof of the uncountability of the set of real numbers. [PLO: 1,2,3]
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]

Program Learning Outcomes (PLO): Students graduating from SFA with a B.S. Degree and a major in mathematics will:
1. Written Communication - SFA Mathematics majors communicate mathematical ideas effectively in written form, integrating mathematical notation correctly and consistently.
2. Verbal Communication - SFA Mathematics majors communicate mathematics effectively to diverse audiences.
3. Mathematical Maturation - SFA Mathematics majors grow from a computational understanding of mathematics to an integrated approach which includes critical thinking proficiency, computational facility, conceptual understanding, and problem-solving persistence.

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.

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On-campus Resources:
SFASU Counseling Services
www.sfasu.edu/counselingservices
3rd Floor Rusk Building
936-468-2401

SFASU Human Services Counseling Clinic
www.sfasu.edu/humanservices/139.asp
Human Services Room 202
936-468-1041

Crisis Resources:
Burke 24-hour crisis line 1(800) 392-8343
Suicide Prevention Lifeline 1(800) 273-TALK (8255)
Crisis Text Line: Text HELLO to 741-741

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
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Date of document: 08/17/2021
Math 3360–Introduction to Modern Mathematics
Course Syllabus

Course description: Introduction to logic, basic properties of sets, relations, functions, one-to-one functions, set equivalence, Cantor’s Theorem, countable and uncountable sets.

Credit hours: 3

The following is an excerpt from SFA 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 a minimum of 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.

Course Prerequisites and Corequisites: MATH 2314 and MATH 2314L

Course outline:  

- Logic
  - Statements and truth values
  - Compound statements
  - Truth tables
  - Valid and invalid arguments
  - Quantified statements
  - Mathematical Proof Techniques
    - Proving universally quantified statements
    - Examples and counterexamples
    - Direct conditional proofs
    - Indirect proofs (contrapositive and contradiction)
    - Proof by cases
    - Uniqueness proofs
    - Mathematical induction

- Set Theory
  - 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
  - Definition of function, domain, codomain, range
  - Images, pre-images

Approximate time spent:

- Logic 20%
- Mathematical Proof Techniques 30%
- Set Theory 20%
- Functions 10%
Student Learning Outcomes (SLO): At the end of MATH 3360, 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: 1,2,3]
2. Translate between symbolic logic notation and standard English. [PLO: 1,2,3]
3. Understand and interpret compound statements, logical arguments, and fallacies. [PLO: 1,2,3]
4. Make appropriate inferences based on conditional and biconditional statements. [PLO: 1,2,3]
5. Understand the role of quantifiers in mathematical statements. [PLO: 1,2,3]
6. Formulate reasonable conjectures and construct rigorous, well written proofs using a variety of proof techniques (including direct and indirect proofs). [PLO: 1,2,3]
7. Construct appropriate counterexamples to disprove statements. [PLO: 1,2,3]
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]
10. Understand and construct proofs concerning subsets and set equality. [PLO:1, 2,3]
11. Recognize and prove theorems about equivalence relations, including congruence relations on the set of integers. [PLO: 1,2,3]
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]
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]
14. Understand a proof of the uncountability of the set of real numbers. [PLO: 1,2,3]
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]

Program Learning Outcomes (PLO): Students graduating from SFA with a B.S. Degree and a major in mathematics will:

1. Written Communication - SFA Mathematics majors communicate mathematical ideas effectively in written form, integrating mathematical notation correctly and consistently.
2. Verbal Communication - SFA Mathematics majors communicate mathematics effectively to diverse audiences.
3. Mathematical Maturation - SFA Mathematics majors grow from a computational understanding of mathematics to an integrated approach which includes critical thinking proficiency, computational facility, conceptual understanding, and problem-solving persistence.

This course meets educator preparation standards for one or more certification programs; a complete listing of all the educator preparation standards this course meets can be found at: https://sfasu.edu/docs/jacksteach/jacksteach-standards-alignment-chart.xlsx

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.

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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:
- using or attempting to use unauthorized materials on any class assignment or exam;
- falsifying or inventing of any information, including citations, on an assignment;
- helping or attempting to help other student(s) in an act of cheating or plagiarism.

Plagiarism is presenting the words or ideas of another person as if they were one's own. Examples of plagiarism include, but are not limited to:
- submitting an assignment as one's own work when it is at least partly the work of another person;
- submitting a work that has been purchased or otherwise obtained from the Internet or another source;
- incorporating the words or ideas of an author into one's paper or presentation without giving the author 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](http://www.sfasu.edu/disabilityservices).

SFASU Mental Health Statement: SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
SFASU Counseling Services  
[www.sfasu.edu/counselingservices](http://www.sfasu.edu/counselingservices)  
3rd Floor Rusk Building  
936-468-2401

SFASU Human Services Counseling Clinic  
[www.sfasu.edu/humanservices/139.asp](http://www.sfasu.edu/humanservices/139.asp)  
Human Services Room 202  
936-468-1041

Crisis Resources:  
Burke 24-hour crisis line 1(800) 392-8343  
Suicide Prevention Lifeline 1 (800) 273-TALK (8255)  
Crisis Text Line:  Text HELLO to 741-741
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.

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