Foundations of Mathematics MATH 3313  
Spring 2015

A. COURSE INFORMATION

Course number/section: MATH 3313.001
Class meeting time: MW 05:30-06:45 PM
Class location: CI-122
Course Website: https://bb9.tamucc.edu/webapps/login/

B. INSTRUCTOR INFORMATION

Instructor: Dr. Alexey I Sadovski
Office location: CI-338
Office hours: M W 4:00-5:30 PM, T R 1:00-2:00 PM
Telephone: 361-825-2477
e-mail: Alexey.sadovski@tamucc.edu
Appointments: e-mail to make an appointment

C. COURSE DESCRIPTION

Catalog Course Description
This course assists a student’s transition from calculus to advanced mathematics. Fundamentals of logic and proof are reviewed and applied to topics from analytic geometry and coordinate systems, complex numbers and elementary number theory. Prerequisite: MATH 2414 and MATH 2305. Fall, Spring.

Extended Course Description
[delete and describe any additional topics that you will cover if there are any]

This course introduces students to fundamental ideas in logic and set theory needed for courses in higher mathematics and for secondary school and collegiate teaching. Techniques of proof, such as proof by contradiction and proof by induction, are used in various settings, such as analytic geometry and coordinate systems. The proper use of quantifiers, multiply quantified statements, properties of functions and relations on sets, modular arithmetic and equivalence relations, and partial orderings are emphasized. Examples used in this course will be taken from number theory, combinatorics, graph theory, modern algebra, and advanced calculus.

The following topics will be covered:
• Set Theory, Logic and Propositional Calculus
• Logic and Predicate Calculus (Quantifiers)
• Applications to Proofs in Set Theory, Numbers, and Calculus
• Methods of Proof (Mathematical Induction, Indirect Proofs, Epsilon-Delta Proofs)
• Relations (Equivalence Relations, Equivalence Classes, Partial Orderings)
• Functions and Mappings (Injective, Surjective, Bijective, Image, Inverse Image)
• Cardinality of Sets
• Axioms of Real and Complex Number Systems
• Introduction to Advanced Calculus (if time permits)
D. PREREQUISITES AND COREQUISITTES

Prerequisites
MATH 2414 Calculus II and MATH 2305, Discrete Math

Corequisites
none

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Required Textbook(s)

A Transition to Advanced Mathematics, by Smith, Eggen and St. Andre, Brooks/Cole, 7th ed. is required.

Optional Textbook(s) or Other References
none

Supplies
none

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. To make proofs of theorems
2. To read and understand arguments involving set theory and logic with minimal assistance from the instructor
3. To write proofs of basic results in advanced calculus and set theory which include multiply quantified statements
4. To present mathematically precise arguments to peers, beginning college students, and secondary school students
5. To develop reasoning skills needed in higher mathematics course work and mathematics teaching

G. INSTRUCTIONAL METHODS AND ACTIVITIES

Class meetings will usually consist of lectures over the material of the course and a combination of individual and small group work as well as whole-class discussion, with students presenting their work at the board. The focus both in class and outside will be on working problems and discussing solutions designed to lead students from an operational to a
structural understanding of the course material. (Anna Sfard defines "operational" understanding to mean understanding at the level of process or computation, while "structural understanding" is defined as when students incorporate the ideas to create a new abstract mathematical object, which can in turn be the foundation of further mathematical objects. She has developed evidence to show that both historically and in individual students, operational understanding must come before structural.)

H. MAJOR COURSE REQUIREMENTS AND GRADING

SLO will be measured by quizzes, exams, and projects.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation/in-class work</td>
<td>5%</td>
</tr>
<tr>
<td>Paper-projects in the form of home assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Quizzes (5-7 over the semester)</td>
<td>35%</td>
</tr>
<tr>
<td>2 Midterm exams</td>
<td>30%</td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>20%</td>
</tr>
</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

Pending

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>TOPIC</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Topic 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topic 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exam 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exam 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>...</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Holiday – No classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final Exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Changes in this course schedule may be necessary and will be announced to the class by
the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness

Attendance: This is probably obvious, but since 5% of your grade is based on in-class work, unexcused absences will have a negative effect on your grade. I will not give any credit or punishment for attendance.

1. Attendance required, exceptions are sickness, job and family emergencies, but I will not use class roll at any time, because it is your responsibility to be in class and attend to the process of learning (see also II.2.).
2. Please, print your name on all assignments and tests: your professor is not a decoding device.
3. If you have questions you MUST ask, you have the right to interrupt lecture or discussion at any time (see also II.1).
4. I am always open for all questions and discussions during the class and office hours. You can always arrange meeting with me at any other time suitable for both sides.
5. No multi-choice tests, all tests will consist of problems you have to solve from the beginning to the end. Partial credit will be given for any parts of problems solved. The policy is open books and notes, no talking, no cheating.
6. No open books and notes during quizzes.
7. Papers must be turned on time.
8. There is no social promotion in my classes. Grades are given only for knowledge acquired (see also II.9.).

Late Work and Make-up Exams
If you are unable to attend the midterm or the final and you wish to make it up, I need to hear from you no later than 24 hours after the missed test or final. You should be able to provide adequate documentation of why your absence was necessary. If you wait more than 24 hours to contact me, you will also need to provide adequate documentation of why you were unable to meet the 24-hour deadline. As an example, "I was called out of town unexpectedly on business" might be a valid reason to miss a test, but it is not an adequate reason to miss the 24-hour notification requirement.

Extra Credit
none

Cell Phone Use
Use of mobile phones prohibited

Laptop Use
none
Food in Class
No food or drinks

Missed Exam
If you are unable to attend the midterm or the final and you wish to make it up, I need to hear from you no later than 24 hours after the missed test or final. You should be able to provide adequate documentation of why your absence was necessary.

Participation
Part of the final grade

Others
none

K. COLLEGE AND UNIVERSITY POLICIES

- Academic Integrity (University)
  It is expected that university students will demonstrate a high level of maturity, self-direction, and ability to manage their own affairs. Students are viewed as individuals who possess the qualities of worth, dignity, and the capacity for self-direction in personal behavior.
  See Full University Policy at http://catalog.tamucc.edu/content.php?catoid=10&navoid=313#Academic_Integrity

- Classroom/Professional Behavior

- Deadline for Dropping a Course with a Grade of W (University)
  The grade of W will be assigned to any student officially dropping a course by Friday, April 10, 2015. No student is eligible to receive a W without completing the official drop process by this deadline. Visit the Office of the University Registrar for the Course Drop Form that must be submitted. After April 10, 2015 a student will not be allowed to drop a course.

- Grade Appeals (College of Science and Engineering)
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at
http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage at http://sci.tamucc.edu/students/GradeAppeal.html. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**  
Disability Services (DS) is the hub for coordinating services and accommodations to ensure accessibility and utilization of all programs for all Texas A&M University-Corpus Christi students with disabilities. Our services are designed to meet the unique educational needs of enrolled students with documented permanent or temporary disabilities. DS provides intake and consultation services to students seeking to register with our office. DS reviews an individual’s documentation of disability and assesses eligibility for services and the determination of reasonable accommodations. For more information visit the Disability Services Office at 116 Corpus Christi Hall or go to http://disabilityservices.tamucc.edu/

**Academic Honesty**  
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, forgery, or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) For the complete statement, see http://catalog.tamucc.edu/content.php?catoid=10&navoid=313%23Academic_Integrity#Academic_Honesty

**L. OTHER INFORMATION**

none

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.