MATH 3313.001 Foundations of Number Theory

FALL 2016

A. COURSE INFORMATION

Course number/section: MATH 3313.001
Class meeting time: T R 11AM-12:15 PM
Class location: Center for Science 107
Course Website: https://bb9.tamucc.edu/

B. INSTRUCTOR INFORMATION

Instructor: Dr. Alexey L Sadovski
Office location: CI-338
Office hours: MW 2-3:30 PM & TR 1-2 PM
Telephone: (361) 825-2477
E-mail: Alexey.Sadovski@tamucc.edu
Appointments: Appointments also available. Office hours subject to meetings related to other duties on campus. They may change during the semester.

C. COURSE DESCRIPTION

This course assists a student’s transition to advanced mathematics. Fundamentals of logic and proof are reviewed and applied to topics from elementary number theory.

D. PREREQUISITES FOR THE COURSE

MATH 2414 Calculus II and MATH 2305, Discrete Math.

E. TEXT AND OTHER SUPPLIES REQUIRED

A Transition to Advanced Mathematics, by Smith, Eggen and St. Andre, Brooks/Cole, 8th ed. is required

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, a student should be able to:

1. Understand the structure and properties of number systems
2. Read and understand arguments involving set theory and logic with minimal assistance from the instructor
3. Generalize mathematical observations of special cases
4. Write proofs of basic results in number theory which include multiply quantified statements
5. Present mathematically precise arguments to peers, beginning college students, and secondary school students
6. 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 their 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

<table>
<thead>
<tr>
<th>Type of assignment</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>Class participation/in-class work</td>
<td>10%</td>
</tr>
<tr>
<td>Paper-projects in the form of home assignments</td>
<td>10%</td>
</tr>
<tr>
<td>Quizzes (5-6 over the semester)</td>
<td>35%</td>
</tr>
<tr>
<td>Midterm exams (2 tests)</td>
<td>25%</td>
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<tr>
<td>Final</td>
<td>20%</td>
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</tbody>
</table>

Letter grades will be assigned according to the table:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>86 to 100</td>
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<tr>
<td>B</td>
<td>76 to 85</td>
</tr>
<tr>
<td>C</td>
<td>66 to 75</td>
</tr>
</tbody>
</table>
**Class participation/in-class work:** As noted above, class meetings will consist of small-group work and whole-class discussion. You will self-assess your participation three times over the course of the semester using a rubric I will hand out. I reserve the right to alter your self-assessment if I feel it is much too high or too low.

**Quizzes:** No open books and notes. Quizzes are on understanding of the basic material of the course.

**Midterm and Final:** I will discuss these in more detail as the times for them approach. The midterm will be given outside of class time so as to allow a longer period of time for you to take it. To compensate you for the time spent on the midterm, there will be no class meetings that week. Dates for the midterm and final are:

### I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>Week</th>
<th>Content</th>
<th>Week</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/24-08/26</td>
<td>Propositions, 1.1</td>
<td>10/17-10/21</td>
<td>Relations 3.1</td>
</tr>
<tr>
<td>08/29-09/2</td>
<td>Conditionals, Quantifiers 1.2-1.3</td>
<td>10/24-10/28</td>
<td>Equivalency relations and partitions 3.2-3.3</td>
</tr>
<tr>
<td>09/5-09/9</td>
<td>Basic proofs 1.4-1.5</td>
<td>10/31-11/4</td>
<td>Ordering relations 3.5</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Exam 2</td>
</tr>
<tr>
<td>09/12-09/16</td>
<td>Proofs with quantifiers 1.6-1.7</td>
<td>11/7-11/11</td>
<td>Finite sets, equivalent sets 5.1</td>
</tr>
<tr>
<td>09/19-09/23</td>
<td>Strategies of proofs 1.7-1.8</td>
<td>11/14-11/18</td>
<td>Infinite sets 5.2</td>
</tr>
<tr>
<td>09/26-09/30</td>
<td>Sets and operations on sets 2.1-2.3</td>
<td>11/21-11/25</td>
<td>Reading days Thanksgiving</td>
</tr>
<tr>
<td>10/3-10/7</td>
<td>Mathematical induction 2.4-2.5</td>
<td>11/28-12/2</td>
<td>Countable sets, cardinal numbers 5.3-5.4</td>
</tr>
<tr>
<td>10/10-10/14</td>
<td>Counting and Combinatorics 2.6</td>
<td>12/5-12/6</td>
<td>Axiom of choice 5.5</td>
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</table>
Final Exam will take place on Thursday, December 8, at 11AM-1:30 PM at CI-107

A. COURSE POLICIES

Attendance/Tardiness
required
Late Work and Make-up Exams
N / A

Extra Credit
N / A

Cell Phone Use
N / A

Laptop Use
yes

Food in Class
no

Missed Exam
N / A

Participation
required

Others
N / A

B. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
  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, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms,
labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **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. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must be submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day 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](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](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**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or
visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

- **[Other important policies]**

**C. OTHER INFORMATION**

- **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

  [delete and insert any additional notes, your expectations of the students, etc.]

**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.