General information.

- Semester: Spring, 2018.
- Lecture Time: 12:30 pm - 1:50 pm, Wednesday and Friday.
- Lecture Venue: FL404 (Fleming Hall).
- Credit hours: 3.
- Instructor: Shi Bai, SE230, `sbai@fau.edu`
- Office hours: see course website.

Description. Number theory is one of the oldest and most beautiful branches of mathematics. Yet it continues to be a dynamic research area and has numerous applications in the real-world (such as cryptography). In this course, we will cover basic topics in number theory including: the principle of induction; the primes, divisibility and congruences; the theorems of Fermat, Euler and Wilson; primitive roots and quadratic residues; diophantine equations. We will also introduce some applications of number theory such as cryptography and computational aspects of number theory.

Textbook. We will mainly follow the textbook,

- Wissam Raji, *An introductory course in elementary number theory*, 2013.
  `https://www.saylor.org/site/wp-content/uploads/2013/05/An-Introductory-in-Elementary-Number-Theory.pdf`

Supplementary reading. For additional reading,

- George E. Andrews , *Number Theory*, W.B. Saunders Company, 1971.
  `https://archive.org/details/NumberTheory_862`
- Victor Shoup, *A Computational Introduction to Number Theory and Algebra*, Cambridge University Press; 2 edition, 2009.
  `http://www.shoup.net/ntb/`

Evaluation

The grade for the course will be determined by:

Quizzes (30%), Midterm Exam (20%), Group project (10%), Final Exam (40%).

Homework and quizzes. Every week there will be some homework exercises posted online. They will not be graded, however, I strongly suggest you do them. Every Friday we will have a quiz of about 20 minutes on the material covered in class (and possibly from last week's homework exercises). The 10 quizzes count for 30% of the overall grades. A missed quiz will result in a score of 0, with no possible make-up. The only exception is any quiz missed due to a university-excused absence; such quizzes may be made up with appropriate documentation.

Mid-exam. There will be a midterm exam, which counts for 20% of your overall grade. The tentative date of the midterm exam is late Feb. The midterm exam will cover the lectures and topics taught during the first half semester.

Mini group project. A mini (group) project on the applications of number theory will be given during the semester, which counts for 10% of the grade. The evaluation will be a group presentation and discussion.

Final exam. There will be a final exam, which counts for 40% of your overall grade. It is comprehensive and cover the topics taught during the whole semester.

Grading. Your overall grade will be calculated by the following algorithm,

- There will be ≥ 10 quizzes. But only your best 10 quizzes will be taken into account towards your final grade; the others will be dropped.
- Mid-exam weights 20% and final exam weights 40%. Project weights 10%.
- If your overall score calculated as above is $\geq$ C:
  - If the lowest exam grade is the midterm (in terms of percentage), the final exam score will replace your midterm score. In this case, the final exam will worth 60% of the overall score.

  Else:
  - The same protocol as above. However, your maximum grade is C.

Grading scale. At the end of the semester, the following scale for FAU grade will be used.

%	92-100	89-91	86-88	83-85	80-82	75-79	70-74	60-69	0-59
Grade	A	A-	B+	B	B-	C+	C	D	F

You should try to meet the above scale to be assured of the grade you want. A grade of I (incomplete) will only be given for circumstances specified in the FAU Catalog. This rarely happens.

Tips for learning math

For a more detailed guide, see `http://math.fau.edu/ford/mathmajors/TFTMC/`.

- Make sure you read the textbook. Pay special attention to definitions, where the authors tell you the meaning of the words and symbols that they are going to use. Read the examples before you attempt to do the problems. Even better: read ahead of the lectures. You will find the lecture makes a lot more sense if the initial shock is behind you.
- Do more problems than you want to. Some questions can seem easy to answer at first glance – make sure you complete the full proof for these questions. Finish the entire problem before you look at a list of answers to see if you got it right. If you can work the problems without assistance, you will do well in the course. When you're done with a problem take a minute to think about what you just did and why. This will deepen your understanding and levitate your grade.

Course Policies

Attendance. Attendance is required. Students are expected to be regular in class attendance and to fully participate in the course. Grade penalties will be imposed for unexcused absences.

Exam policies. No calculator, books, notes will be allowed at any time during quizzes and/or exams. All exams will be taken as scheduled. Make-up examinations will not be given for missed tests, unless prior arrangements have been made under exceptional circumstances with advance notice. In the case of a valid excuse, it is the students responsibility to establish with documentation that the exam was missed for a solid reason. The student cannot make up a missed midterm or final exam without such documentation.

Disclaimer. This syllabus is subject to reasonable changes/updates at the discretion of the instructor.