Math 3319 (3 credits)   **ELEMENTARY NUMBER THEORY**   Fall 2008
MW 1:30–2:50   **Syllabus**
LART 210

Instructor: **Dr. Art Duval**

  office: **Bell Hall 303**

  phone: **747-6846**/office (24hrs./day; if I'm not in, please leave a message)
             747-6502/fax   (include a cover sheet with my name, please)
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  internet: artduval@math.utep.edu
            http://www.math.utep.edu/Faculty/duval/home.html

  Office hours: **Mon, 3:00–4:00; Tue, Fri, 10:00–11:00; Wed, 11:00–12:00.** Please feel free to come by my office any time during scheduled office hours. You are welcome to come at other times, but in that case you might want to make an appointment, just to make sure that I will be there then. You can make an appointment simply by talking to me before or after class, by calling me at my office or at home, or by sending e-mail.

  You may also ask any questions directly via phone or e-mail. If I'm not in when you call, please leave a message on the voice-mail or answering machine with your name, number, and a good time for me to call you back. I will try to respond to your phone or e-mail message as soon as possible.

Website: http://www.math.utep.edu/Faculty/duval/class/3319/084/home.html
  Here you will find this syllabus, and relevant links, including homework and reading assignments for the whole semester, as they are announced. Other resources may become available.

Prerequisites: Calculus II (Math 1312). This is entirely a mathematical maturity requirement, as we will use no calculus in this course.

COURSE OBJECTIVES: Upon successful completion of this course, you will be able to construct simple proofs using the basic definitions of number theory. You will be able to apply fundamental theorems of number theory in appropriate situations. Specific topics include: divisibility; Diophantine equations; prime numbers; modular arithmetic; Chinese Remainder Theorem; and Fermat's Little Theorem. If time permits, we will see how these concepts can be used in public key cryptography.

  Note that your previous math courses may not have included any proofs, or asked you to prove anything. This course will **mostly** be about proofs, which may be a radical change for you.

Textbook: **Number Theory Through Inquiry, by Marshall, Odell, and Starbird, Chs. 1–5.** This book differs from other texts for proof-based courses, in that the proofs of the theorems are not included. The point of this is for you, the student, to fill in these details, in order to be more actively involved with the material. To make this task more manageable, intermediate results to help guide you are included. Read the introduction carefully for more details.

Course structure: The course is built around student presentations of proofs of results, and solutions to problems, from the textbook, while I serve as moderator. (I will also occasionally give short presentations to put topics into a wider context.) I will announce the approximate schedule I expect us to follow one or two class periods in advance, and maintain that information on the course website.

I will pick students (sometimes asking for volunteers on harder proofs) to present their work in class. Presentations will be evaluated on: the quality and correctness of the content; the clarity of the presentation; the difficulty of the problem; and the frequency of your contributions. Making substantial progress, or asking a good question, about a harder problem without solving it may be worth as much as solving an easier problem.

When you are in the audience, you are still expected to be actively engaged in the presentation. This means checking to see if every step of the presentation is clear and convincing to you, and speaking up when it is not. When there are gaps in the reasoning, the class will work together to fill the gaps.

You will work outside of class to prove results, solve problems, and write your work to turn in as homework, ideally before the material is presented to the whole class. Even after a particular problem or proof is presented to the class, you may turn it in up to one week later, but only for reduced credit. Please keep copies of your written work for your use while I am grading it.

GRADES:

Participation and Homework (40%) Your presentations, audience participation, and written homework submissions will contribute approximately equally to this portion of your grade. This is based on your **overall** contribution to keeping the course moving (which includes forward progress, making sure presentations are complete and correct, helping other students' understanding) and on your ongoing understanding of the material. I will use the following rubric:

A Clear, correct presentations to most problems; helpful audience participation including appropriate feedback and good questions; most problems written up in advance.

B Correct presentations to routine problems; active audience participation including questions and discussions; routine problems written up in advance, harder problems written up eventually, but clearly.

C Correct presentations to easier problems, and reasonable attempts at routine problems; responding in the audience when called on, posing questions when you are confused, and participating in discussions; most problems written up eventually, mostly correct.

D Less than satisfactory work, but an apparent honest effort to understand material. At least some presentations with reasonable attempts; participating in the audience with questions or comments; most problems written up eventually.

Exams (15% each) There will be two in-class, closed-book exams on the following days:

Wed., 24 Sep.
Wed., 22 Oct.

Each exam will cover material from the beginning of the semester, though the second exam will focus more on material since the first exam. Makeup tests can be given only in extraordinary and unavoidable circumstances, and with advance notice.

Final (30%) The final exam will be comprehensive over all material we discuss in class. The final will be on

> Wed., 10 Dec., 4:00–6:45 p.m.

POLICIES:

Collaboration: You may **not** consult books, the Internet, other people outside of class, or other sources to solve the problems or write your solutions. I do strongly encourage you to work with your classmates on the problems in advance. I also encourage you to talk to me frequently, more than in other courses. Feel free to ask questions about the material, show me your work before presenting it in class, and even just talk about your frustrations.

Academic dishonesty: It is UTEP's policy, and mine, for all suspected cases or acts of alleged scholastic dishonesty to be referred to the Dean of Students for investigation and appropriate disposition. See Section 1.3.1 of the Handbook for Operating Procedures.

Attendance: Due to the course structure, attendance is mandatory. There is no particular penalty for missing a particular class, but you cannot get a good participation grade if you miss too many classes. I will usually "excuse" an absence if you tell me about it in advance, or, in cases of emergencies, as soon as possible afterwards.

Drop date: The deadline for student-initiated drops with a W is Friday, October 31. After this date, you can only drop with the Dean's approval, which is granted only under extenuating circumstances.

I hope everyone will complete the course successfully, but if you are having doubts about your progress, I will be happy to discuss your standing in the course to help you decide whether or not to drop. You are only allowed three enrollments in this course, and students enrolled after Fall 2007 are only allowed six withdrawals in their entire academic career, so please exercise the drop option judiciously.

Courtesy: We all have to show courtesy to each other, and the class as a whole, during class time. Please arrive to class on time (or let me know when you have to be late, and why); do not engage in side conversations when one person (me, or another student) is talking to the whole class; turn off your cell phone (or at least set it to not ring out loud), and do not engage in phone, email, or text conversations during class.

Disabilities: If you have, or suspect you have, a disability and need an accommodation, you should contact the Disabled Student Services Office (DSSO) at 747-5148, `dss@utep.edu`, or Union East room 106. You are responsible for presenting to me any DSS accommodation letters and instructions.

Exceptional circumstances: If you anticipate the possibility of missing large portions of class time, due to exceptional circumstances such as military service and/or training, or childbirth, please let me know as soon as possible.