Number Theory

MA 261–002

Fall Semester 2014

Classroom:	337 Whitehall Classroom Building
Time:	MWF 10:00–10:50 AM

Professor:	Dr. David Royster
Office:	Patterson Office Tower 759
Office Hours:	MWF 11:00-12:00 or by appointment
Office Phone:	859–257–1258
email:	david.royster@uky.edu
URL:	http://www.msc.uky.edu/droyster

Class Homepage:

http://www.msc.uky.edu/droyster/courses/fall14/MA261 **and on Blackboard**
http://elearning.uky.edu

Text: *Number Theory through Inquiry*; David Marshall, Ed Odell, Mike Starbird; MAA Textbooks, ISBN: 9780883857519.
Electronic version: $25, http://www.maa.org/publications/ebooks/number-theory-through-inquiry

Prerequisites: MA 114 or consent of instructor

Objective: In this course we will cover the fundamentals of number theory, which include many simple and deep results about integers. The main topics will be: Divisibility, Prime Numbers, and Modular Arithmetic, with additional topics if time permits.

The course will be taught with the method of *Inquiry Based Learning*, which is also known as the *Discovery Learning*. The textbook contains a series of *Exercises*, *Questions*, *Lemmas* and *Theorems*, but no proofs. You, the students, will be responsible for proving these statements on your own and in small groups. In class, you will present these proofs at the board and explain your reasoning to your peers. As a class we will work together to determine whether or not a proof is correct. Our progress will be slow, but that is okay. The goal is for each student to gain a complete understanding of the material that we cover by actively doing mathematics rather than passively listening to lectures. In this course you will learn how to work with

definitions, construct rigorous mathematical arguments, learn various methods of proof, and develop mathematical writing and presentation skills.

Assessment: We will have 2 in-class exams, regular homework, quizzes and participation. The schedule indicates that the time for the Final Exam is Tuesday, Dec 16 from 01:00 PM – 03:00 PM. We are required to meet during this time by University policy.

Participation: You are expected to participate in class discussions and present solutions on the board when called upon in class. I will keep track of how many times you present at the board, and also note your participation in class discussions. *Due to the nature of this course, it is absolutely essential that you attend class.* You will be allowed 3 absences with no penalty. After this point, I reserve the right to drop your Homework and Participation grade by 10 points for each additional absence.

Grading:

Exam 01	15%
Exam 02	15%
Participation & homework	30%
Quizzes	20%
Final exam	20%

Final Grade	A	B	C	D	E
Percentage	90 – 100%	80 – 89%	70 – 79%	60 – 69%	< 60%

Mid-term Grades: Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar http://www.uky.edu/Registrar/AcademicCalendar.htm

Homework: I will assign 1 – 3 problems or proofs per week to be handed in by each individual. I expect all proofs to be written in full sentences and grammatically correct. Each proof or problem will be graded on the following scale:

5	Correct mathematical proof and well-written.
4	Small mathematical and/or grammatical errors.
3	Contains good ideas, but still an incorrect proof.
2	Significant mathematical errors
1	See me!

If you receive a grade of 3, 2, or 1 on any proof, you may turn that proof in again for an entirely new grade. I will keep only the highest score. Rewrites are due exactly one week from when I return homework. You may work with your peers to prepare

problems but you must write up solutions individually. Do not turn in what are essentially Xerox copies of each other's homework. No late homework will be accepted.

Using the Web: Yes, there are proofs of most of the things we will prove on the Web, somewhere. I know that the temptation is great to just look up the proof and copy it down. That defeats the whole purpose of your attending the course. Your job in this course is to learn how to prove things, not learn how to do a web search. Also, you will not have access to the web on tests or quizzes. If you are having trouble with a proof, ask a classmate, a graduate student, or, oddly enough, your professor. In the end it is you who will have to explain your proof. If you don't understand it, we will know.

Quizzes: Each week, there will be a quiz consisting of one proof. This will either be a proof already discussed in class or a proof similar to what has been covered in class. Each quiz will be graded on the following scale:

5	Correct mathematical proof and well-written.
4	Small mathematical and/or grammatical errors.
3	Contains good ideas, but still an incorrect proof.
2	Significant mathematical errors
1	Present for quiz, but that is all.

The quiz grades will be cumulative up to each exam, and graded out of 15 points. If you earn 15 points before the next exam, you do not have to take the remaining quizzes.

Class Policies: There are several policies to which you must pay heed.

i) Attendance is extremely important in a class of this level. If you feel that you do not need to attend this class, you are in the wrong classroom—go find a course in which you will be challenged and in which you will learn something new.

ii) You are allowed three absences Any absences beyond this will have an impact on your grade for the course.

iii) Be respectful of your classmates and your professor while in class or at office hours. Turn your cell phone to "Do not disturb" and do not bury your face in your computer or cell phone, unless your are requested to retrieve some information.

iv) Academic dishonesty will be punished severely. Be cognizant of Article II of the *Student Code of Conduct*.

v) Be on time to class and remain until dismissed. Do not leave in the middle of class.

vi) If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive

accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Room 2, Alumni Gym, 257-2754, jkarnes@email.uky.edu) for coordination of campus disability services available to students with disabilities.

Inclement Weather Policy: The University of Kentucky Severe Weather Policy can be found at http://www.uky.edu/PR/News/severe_weather.htm. The UK Infoline at (859) 257-5684, UK TV Cable Channel 16 and 19, or the UK Web site at www.uky.edu are the best places to find the most up-to-date situation. In the event that we have *inclement weather*[1] but the University does not close or cancel classes, and I have to cancel the class, a message to that effect will be left on my voicemail (859–257–1258) and I will email every member of the class (if I have access to email).

If you feel that travel during *inclement weather* would be hazardous, then try to inform me as soon as safely possible. You will be given the opportunity to make up any work missed or due on that day. As always, each student is responsible for any work missed and will be expected to get the notes from another student or from the web.

Excused Absences: Students need to notify the professor of absences prior to class when possible. **Senate Rule** 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused or unexcused) per university policy.

Verification of Absences: Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence.

---

[1] Snow, ice storm, high and dangerous winds – not heavy frost.