MATH 4281: INTRODUCTION TO MODERN ALGEBRA

Spring 2020   **Prof. Christine Berkesch**
(01) MWF 10:10 AM -- 11:00 AM, Ford Hall B15   **Office: Vincent Hall 254**
(02) MWF 11:15 AM -- 12:05 PM, Vincent Hall 211   **cberkesc@umn.edu**

Course website. http://www-users.math.umn.edu/ cberkesc/4281/Spring2020/4281.html

Office hours. See the course website for specific times. Also available by appointment, as needed.

Textbook. Abstract Algebra: An Inquiry-Based Approach by Hodge, Schlicker, and Sundstrom. This is available through UMN's library as an ebook.

Textbook Errata. A list of errors and typos is available here.

Prerequisite. MATH 2283 or MATH 3283 or instructor consent

Course description. Equivalence relations, greatest common divisor, prime decomposition, modular arithmetic, groups, rings, fields, Chinese remainder theorem, matrices over commutative rings, polynomials over fields.

Course Goals.
- Solve both computational and conceptual/theoretical problems involving rings and fields.
- Write algebraic proofs with awareness of audience, mathematical context, and proper notation and terminology.
- Demonstrate the ability to think abstractly.
- Read, evaluate, and write mathematical proofs that are correct and logically coherent.
- Communicate clearly and effectively in exploring new algebraic ideas.

Typical class period. Rather than chapters, the text is organized by "Investigations." This is meant to emphasize a student-centered approach to the learning process. Class will sometimes include mini-lectures, but for the most part, you will be working together in small groups to investigate the topics as guided by both me and the text. We will work together to explore different facets of algebra and algebraic thinking. We will try to follow the same process for each investigation. Over the semester, we may modify this to fit our own needs.

- Before class, read the text and complete the preview activities (either on your own or collaboratively with classmates). Each investigation in the text opens by explaining the learning objective. You will also complete a pre-class quiz that you need to complete before getting to class.
- In class, we will work together on activities that help parse the reading. Your responses to these activities will not be collected, but serve to prepare you for the work on the homework problems. Exam questions will also be drawn in part from the in-class activities.
- After class, complete homework problems that go with the topics discussed. There will be one homework set due each week, regardless the number of investigations we touch on that week.

Assessment. Your understanding of the material and achievement of the course outcomes will be assessed in a variety of ways. Your grade is broken up into the following categories: Pre-class Quiz/Daily Score, Weekly Homework, 2 Midterm Exams, and a comprehensive Final Exam. More detail about what is expected from you on each of these assignments is given in the following table:

Pre-class Quiz/Daily Score (10%)	You learn mathematics by doing mathematics. You will be expected to prepare for class ahead of time by completing preview activities and reading the section. You will receive a daily score out of 3 points every class period, except on exam days. You will also answer one multiple-choice question everyday **before** class based on the reading assignment. You will receive one point for answering the question and one point if you answer the question correctly. Pre-class quizzes are intended to make sure you are preparing sufficiently for class and will cover the most basic elements of the class preparation for the day. Pre-class quizzes completed after the start of class will not be awarded points.
Weekly Homework (30%)	You will have a weekly homework assignment due **before the start of class** every Wednesday covering the material from the previous week. All homework will be submitted electronically through the course's canvas page. **Your weekly homework assignments must be typed.** You will be given more information about using LaTex to type your homework in class. Most problems on the weekly homework will be graded out of 3 points. A score of 3 means that your proof is correct and well written. A 2 means that you were very close to a correct proof, with one minor issue. A 1 means that you made a good effort, but some editing is needed. A zero means that you did not try at all. You will have one chance for each assignment to revise and resubmit without penalty any problems that did not earn a score of 3, which will result in additional points, totaling a score between 0 and 3. Occasionally, there might be problems with different point values. In each case, you will be made aware of the rubrics and expectations.
Midterm Exams (30%)	You will have 2 in class exams during the semester. The exams are tentatively scheduled for March 6 and April 15. Each exam is scored out of 100 points. It is possible to take an exam early if you have a valid reason. If you have an unavoidable and legitimate university sanctioned excuse for missing an exam, please contact me as soon as possible about this issue, so we can determine a path forward.
Final (30%)	There will be a comprehensive final exam on: (01) 8:00 – 10:00 AM, Saturday, May 9, and (02) 10:30 AM – 12:30 PM, Monday, May 11. The exam must be taken at the scheduled time unless you have more than two final exams on the same day. In this case, please make prior arrangements to take the final at another time.

A note on homework. The homework in this course is intended to be challenging; it is training to help you build stronger mathematical muscles. There will be problems whose solutions are not immediate; there will be times that you will even need to sleep on a problem before fully grasping its solution. With this in mind, I recommend that you give yourself a full week to do the homework, so that only a few challenges remain by the Wednesday before the assignment is due. This gives you time to discuss any difficulties with your classmates and attend office hours in order to complete the problem set.

Selected homework problems (or similar) may be given on exams. This is another reason why you should do the homework before each class and, moreover, remember the ideas and techniques used in your solutions.

Getting help. This class is set up so that you are responsible for your own learning. This does not mean you are alone and it is a sink or swim environment. We are in this together. Below is a list of resources for you to get help when needed:

Office hours	Office hours are for students to drop in and get help. Please use them! The schedule is on the course webpage. I am also happy to make appointments to meet with you if you are unable to attend my office hours. I will almost always be able to accommodate appointment requests made at least 24 hours in advance.
Study groups	You are strongly encouraged to work in study groups and learn from each other, although all final work submitted must be your own. Lind Hall 150 is available for small group meetings and individual study.
Email	When you email me, please include "Math4281" in the subject line. I regularly check my email when I am out of the office, and I am happy to answer your questions that way when possible. Please allow one working day for a response. I will not check my email between 6:00pm on Friday and 6:00pm on Sunday. If I need to communicate with you outside of our scheduled class-time, I will use your UMN email address. Please check it on a regular basis (at least once per day Monday – Friday).
Find a tutor	See Tutoring Resources at UMN here.
Disabilities	Students with disabilities who will be taking this course and may need disability-related accommodations are encouraged to make an appointment with me as soon as possible. Also, please contact UMN's Disability Services to register for support.

Citizenship. Certain environments are more conducive to learning than others. In particular, a classroom filled with people who are on time, ready to work, and respectful is key to everyone having a positive experience. Below details the specific expectations I have of you as far as citizenship goes.

Attendance	Students are responsible for attending all sessions of all classes for which they are enrolled. If you miss class on a non-exam day for an unexcused reason, you forfeit the right to turn in the homework that was due that day.
	If you must miss an exam and provide me with a legitimate reason in advance, you may take a makeup exam without penalty. If you do not give advance notice, you may not be allowed to take a makeup at all, or points may be deducted as a penalty.
	In case of emergency, please contact me immediately. My willingness to accommodate your emergency will be directly related to your prompt efforts to notify me.
Distractions	Tardiness is an unacceptable distraction to the other members of the class. Everyone occasionally runs a few minutes behind, but being tardy an excessive amount or an excessive number of times may result in denial of credit for work due that day or other academic penalty. Usage of cell phones, MP3 players, laptops, etc., during class is inappropriate and discourteous to other members of the class.
Academic Integrity	It is the obligation of each student to uphold the University of Minnesota Student Conduct Code regarding academic integrity. You will be asked to indicate this on your homework assignments. Students are strongly encouraged to discuss the homework problems but should write up the solutions individually. Students should acknowledge the assistance of any books, software, students, or professors.