Syllabus for Math 514, *Modern Algebra*, Fall 2022

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COURSE DESCRIPTION: This course will cover topics from abstract algebra that should be useful to in-service and pre-service teachers teaching algebra, trigonometry, pre-calculus, calculus and geometry. Pre-requisite is an undergraduate course in linear algebra. An undergraduate course in abstract algebra will be helpful, but is not necessary. This will be a proof based course. Prior experience with proving mathematical results is highly recommended. Only one graduate math course should be taken in the same semester.

COURSE GOAL: The goal of this class is to expose you to new concepts in abstract algebra and to deepen your understanding of basic concepts in algebra, trigonometry, pre-calculus and geometry courses at the high school level. This is a content course where you will broaden your knowledge and hopefully your appreciation of algebra which should enhance the teaching (or future teaching) of your individual curriculum. Topics for this course will include the integers, rational numbers, real numbers, complex numbers, groups, rings and fields with an emphasis on polynomials. We will cover most of the sections in Chapters 1-12 of the text.

TEXT (Required): *A Concrete Approach to Abstract Algebra* by Jeffrey Bergen. Available online as an e-book, e-rental or hard copy. Recommended: Student solution manual. Available as e-book only.

ATTENDANCE: This is an online course. There is no campus attendance required. There are no synchronous class meetings. There will be a deadline for turning in each assignment. The deadlines are not flexible, and no late work will be accepted. You must have access to a computer, e-mail, and scanner (a cell phone will work). Assignments must be uploaded to Canvas.

GRADING: The grading will be assigned on a graduate scale: A, A-, B+, B, B-, C, F. A=Excellent, B=Good, C=Poor, F=Fail. Grades will be based on quizzes, midterm, and final. Grades, lectures, assignments, announcements and quizzes will be on Canvas `canvas.jmu.edu`.

QUIZZES: Quizzes will be given once a week after every few sections. Each quiz will cover the material since the last quiz. Quizzes are to be taken on Canvas, in the time specified (usually 30 minutes) or less. Quizzes will be open notes, but not open internet. You may use your notes, homework and the text. You may not click away from the quiz on Canvas to pull up electronic notes or videos. Have all of your material at hand (printed) prior to starting the quiz. Due to the time constraints, you should have a good working knowledge of the material before you take the quiz. You will not have time to spend looking up the answers. The multiple choice, true/false and short answer will be scored immediately upon completion. Proof questions will be graded after the due date. All quizzes must be completed by midnight Eastern Time on the due date (usually Sunday). If you run into an issue with the deadlines, contact me for an extension.

HONOR CODE: You are to abide by the JMU Honor Code at all times. Please familiarize yourself with the code at this site: http://www.jmu.edu/honor/code.shtml#TheHonorCode I will ask you to sign a statement at the beginning of class agreeing to the Honor Code and issues specific to an online course. In particular, you must not share files containing homework solutions, or any quiz or exam solutions with other students in the class. Do not discuss quizzes or exams with other students until after the due dates. Work on quizzes **must be your own work** and not copied from another student, the internet or the solution manual. If you work with other students, be sure to write up your own solution in your own words.

HOMEWORK: Homework problems will be assigned after each section, but not collected. However, it is extremely important that you do the homework and get help if you do not understand the problems. Exams will be based on both lectures/readings and homework. Solutions to homework problems will NOT be posted. You are welcome and encouraged to type up your answers and send them to me for feedback. The reason I do not post homework solutions to proof problems is because there are MANY correct answers and many different ways of proving the same problem. Also, reading a solution and understanding it is COMPLETELY DIFFERENT from being able to write up a correct solution yourself. If you only look at the solution without trying the problem first, you will become very proficient at reading algebra proofs. But you will not become proficient at DOING algebra proofs. Try all of the homework problems BEFORE looking at any solutions.

EXAMS: There will be one midterm exam and a final exam. Both will be closed book and proctored. More details on proctoring are found on canvas. Exams will be free response including definitions, short answers and proofs including problems identical to and similar to homework problems. The final exam will be cumulative with greater emphasis on the material since the midterm.

COMMUNICATION: My communication with you will be through e-mail and Canvas Announcements. You have been assigned a JMU e-mail address that is now listed in Canvas. You can add a different e-mail address by going to "Profile" and "Settings". You can register for text alerts as well. I will send e-mails and announcements through Canvas, so it is very important that you check e-mail often. You can use the discussion section of Canvas to discuss the course with classmates. I will monitor and answer questions there when appropriate. I will hold virtual office hours via Zoom once a week, and I will make individual appointments as requested. You can find the Zoom links on Canvas. You can always ask questions via e-mail at any time.

How to be successful in this class: Videos and PDFs of the lecture notes will be posted on canvas. The lecture notes are a supplement to the text, and, in some cases, contain material that is NOT in the text. The lecture notes tend to be more concise than the text, and emphasize the important concepts. It is recommended that you read the text before the lecture notes. Then watch the videos following along with the lecture notes carefully, writing down definitions and theorems on index cards as you go. At the end of each lecture, there will be homework problems assigned. Refer back to the text or notes as you are working on the homework. In reviewing for a quiz, review your notecards and make sure you understand any definitions, theorems and key concepts in the sections and be comfortable with the homework problems. There will be multiple choice questions on definitions and theorems on the quizzes. Be sure to be familiar with the definitions and understand them completely before taking the quizzes (open book). For the exams you will be required to state definitions (closed book). The definitions do not need to be stated word for word as they are in the text and the notes. They just need to be correct and complete.

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This is the pace and list of due dates for this semester class. You may work as fast as you like, but you may be limited by the availability of the lectures, quizzes and exams. If you have technical difficulty submitting any of the assignments, let me know.

Week 1: 8/24-8/26 Intro, Quiz 0, Copy This Document

Week 2: 8/29-9/2 Lecture 1(2.4), Quiz 1, Section 2.4

Week 3: 9/5-9/9 Lecture 2 (3.1-3.5), Quiz 2, Sections 3.1-3.5

Week 4: 9/12-9/16 Lecture 3 (4.1-4.3), Quiz 3, Sections 4.1-4.3

Week 5: 9/20-9/24 Lecture 4 (5.1-5.4)

Week 6: 9/27-10/1 Lecture 4 (5.5), Quiz 4, Sections 5.1-5.5

Week 7: 10/4-10/8 Lecture 5 (6.1-6.4), Quiz 5, Sections 6.1-6.4

Week 8: 10/11-10/15 Lecture 6 (7.1-7.4), **Wednesday-Friday Fall Break**

Week 9: 10/18-10/20 Quiz 6, Sections 7.1-7.4, **Proctored Midterm 2.4-7.4**

Week 10: 10/25-10/29 Lecture 6a (8.1-8.2) Quiz 6a Sections 8.1-8.2 (only what is covered in the notes and homework), Lecture 7 (9.1-9.2)

Week 11: 11/1-11/5 Lecture 7, (9.3-9.4), Quiz 7 Sections 9.1-9.4

Week 12: 11/8-11/12 Lecture 8 (Ch. 10), Quiz 8 Chapter 10

Week 13: 11/15-11/19 Lecture 9 (Ch. 11), Quiz 9, Chapter 11

Week 14: 11/22-11/26 Thanksgiving Break

Week 15: 11/29-12/3 Lecture 10 (12.1-12.4), Quiz 10 Sections 12.1-12.4 (Chapter 12 is long, start on this early)

Week 16: 12/6-12/10 Review, **Final Exam**

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