Department of Mathematics
University of Houston

MATH 6303 – Modern Algebra II – Spring 2021
Syllabus (as of Jan. 18, 2021)

Instructor: Dr. Gordon Heier
Contact Information:
      Office: 666 PGH (not in Spring '21 due to Covid-19)
      Office Hours: F 3-4, over Zoom (meeting info tba)
      Email: heier@math.uh.edu
      Personal website: www.math.uh.edu/~heier
      Course website: UH Blackboard

Prerequisites: Graduate standing and Math 6302 (or consent of the instructor)

Lectures: Lectures will consist of recorded discussions of a set of typed notes. The pdfs of the notes and the video files of the lectures will be posted on Blackboard as they become available, in an "asynchronous" way. Students will be notified by email once a new posting has been made. The lecture notes from Math 6302 will be made available.

Exams: Midterm Exam: March 24-25 (W-Th), as a 4 hour take-home exam
          Final Exam: May 6-7 (Th-F), as a 4 hour take-home exam

Text: *Abstract Algebra* by David Dummit and Richard Foote, 3rd Edition, ISBN 978-0-471-43334-7

Homework in the form of problem sets will be assigned on Blackboard and will be collected and graded through Blackboard.

Grades: The homework and midterm exam will each account for 30 percent of your grade, the final exam for the remaining 40 percent.

File format for submissions: The ONLY acceptable file format for any submissions by students is PDF. Students should ensure that they have access to a scanner or scanner app on a mobile device at all times. In particular, files in JPG format are NOT acceptable.

Email communications: The primary means of communication for this course is email. Please be sure to monitor your official UH email addresses for important message. Note that you may have several such email addresses. It is assumed that you read ALL messages sent to any of your email addresses.

Disability: If you think or know that you have a disability that needs special accommodation, please see me at the beginning of the semester so that the proper steps can be taken.

Academic Dishonesty will not be tolerated and dealt with appropriately.

UH CAPS Statement: Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the "Let's Talk" program, a drop-in consultation service at convenient locations and hours around campus.
http://www.uh.edu/caps/outreach/lets_talk.html

Excused Absence Policy (as per UH): Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston Undergraduate Excused Absence Policy and Graduate Excused Absence Policy for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to military service, religious holy days, pregnancy and related conditions, and disability.

Recording of Class (as per UH): Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the Center for Students with DisABILITIES. If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Syllabus Changes (as per UH): Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through email.

Main topics likely to be discussed are:

- Ring theory: multivariate polynomials, polynomials over fields, Gauss lemma, polynomial rings that are UFDs, Groebner bases

- Field theory: Fields and field extensions, splitting fields, separable and inseparable extensions, finite fields, Fundamental Theorem of Galois Theory

- Algebraic Geometry: affine algebraic sets, radicals, affine varieties, Hilbert's Nullstellensatz

Sections from the textbook likely to be discussed:

9.1   Polynomial rings: Definitions and basic properties
9.2   Polynomial rings over fields I
9.3   Polynomials rings that are UFDs
9.4   Irreducibility criteria
9.5   Polynomials rings over fields II
9.6   Polynomials in several variables over a field and Groebner bases
13.1 Field theory: Basic theory of field extensions
13.2 Algebraic extensions
13.4 Splitting fields and algebraic closures
13.5 Separable and inseparable extensions
14.1 Galois theory: Basic definitions
14.2 The Fundamental Theorem of Galois Theory
15.1 Algebraic geometry: Noetherian rings and affine algebraic sets
15.2 Radicals and affine varieties
15.3 Integral extensions and Hilbert's Nullstellensatz