MAT 4930/2221-25227: Abstract Algeebra 2

University of Florida, Department of Mathematics
Course Syllabus, Spring 2021

Instructor: Peter Sin
E-mail: sin@ufl.edu Phone: (352) 294–2317
Office: Little Hall 362, Office hours: TBD
My web page: http://people.clas.ufl.edu/sin/

Class meetings: MWF 5th period (11-45-12.35pm), Little 217 (Online)

Course description: A second course in Abstract Algebra, focusing on Galois Theory, the algebraic theory of fields and polynomial equations. Introduces concepts of abstract algebra used in settling famous historical problems including the problems of angle trisection and duplication of cubes by ruler and compass constructions, and the insolubility of polynomial equations of the fifth degree. Topics include: field extensions; the Galois group; the Galois correspondence; radical extensions; algebraically closed fields, finite fields; and historical background.

Prerequisites: MAS4105, MAS4301.

Textbook. Galois Theory, Fourth Edition, by Ian Stewart, CRC press, 2015.

Course Objectives:

- determine irreducibility of polynomials.
- understand the algebraic structure of fields generated by roots of polynomials.
- compute the Galois groups of polynomial equations.
- apply the Galois correspondence to solve cubic and quartic equations by radicals.
- carry out certain ruler and compass constructions and determine that others are impossible.

Homework: Homework will be assigned every week for 14 weeks on a Friday and due the next Friday. The homework will foster mastery over the material covered in class in the previous two weeks. It will include writing proofs of general propositions and computations of specific examples. All problems will be graded and the graded homework will be returned by the following Friday.

Grades: Each homework will be graded out of 10 points. The highest 10 out of 14 scores will count towards your total out of 100. The grade ranges for total scores are:
90-100% A, 87-89% A-, 83-86%B+, 78-82% B, 75-77% B-, 70-74% C+,65-69% C, 60-64% C-, 50-59% D, 0-49% E.

Grading will be in accord with the UF policy stated at https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

Weekly schedule:

- Week 1: Classical algebra, Polynomials, roots.
- Week 2: Factorization of polynomials, Euclidean algorithm, Fundamental Theorem of Algebra.
- Week 3: Field extensions, simple extensions.
- Week 4: Algebraic and transcendental extensions.
- Week 5: Degree of extensions, the Tower Law.
- Week 6: Ruler-and-compass constructions, impossibility proofs.

- Week 7: The idea behind Galois Theory, historical background.
- Week 8: Galois groups, the Galois correspondence.
- Week 9: Splitting fields, normality, separablity.
- Week 10: The Fundamental Theorem of Galois Theory.
- Week 11: Solubility of equations by radicals, radical extensions
- Week 12: The general polynomial equation, elementary symmetric polynomials, solving cubic and quartic equations.
- Week 13: Finite fields.
- Week 14: Algebraically closed fields, Sylow's Theorem.
- Finals Week: Review, discussion.

Announcements: You are responsible for all announcements made in class which could include changes in due dates and office hours.

Class Attendance: Registration in this course obligates the student to be regular and punctual in class attendance. Attendance is expected but not required. Requirements for class attendance and make-up assignments, and other work in this course are consistent with university policies that can be found at: `https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx`.

Excused Absences: In certain circumstances a student will be able to make up a missed exam. These circumstances could include medical situations, family emergencies, travel for University activities (eg. band, debating club, etc), and religious observances. In these cases the student must inform me before or within one week after the missed work and provide written documentation.

Grading Disputes: Any issues or questions about the grading of assignments must be brought to my attention within one week after the assignments are returned to the class.

Course evaluation: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at `https://gatorevals.aa.ufl.edu/students/`. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via `https://ufl.bluera.com/ufl/`. Summaries of course evaluation results are available to students at `https://gatorevals.aa.ufl.edu/public-results/`.

Disabilities statement: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, `http://www.dso.ufl.edu/drc/`) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Health and Wellness:

- U Matter, We Care: If you or a friend is in distress, please contact `umatter@ufl.edu` or 352-392- 1575 so that a team member can reach out to the student.
- Counseling and Wellness Center: `http://www.counseling.ufl.edu`, 352-392-1575.
- Sexual Assault Recovery Services (SARS) Student Health Care Center, 352-392-1161.
- University Police Department, 392-1111 (or 9-1-1 for emergencies). `http://www.police.ufl.edu/`

Academic honesty: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code." On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (`https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code`) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.