

Peter Sin

Department of Mathematics

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\(Special Topics in
Math\)](#)

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[College of Liberal Arts
and Sciences](#)[Mathematics
Department](#)[Mathematics Graduate
Program Page](#)[University of Florida](#)

MAT4930/2221/25227 (Special Topics in Math)

Abstract Algebra 2, Spring 2021

Instructor

Prof. Peter Sin

Time and Location

MWF 5 (11.45am-12.35pm), Online (Lit 217) (A Zoom link will be provided here.)

Office Hours:

TBA (A Zoom link will be provided here.)

Description and Goals

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. You can also use earlier editions, but

the fourth edition is especially recommended for its compelling historical content .

Syllabus

MAT4930syllabus

Class Format

The class will be conducted synchronously by means of Zoom meetings at the scheduled times. All class announcements and assignments will use the appropriate Canvas mechanisms. Please make sure you have an up-to-date version of Zoom.

You will not need a camera to attend the classes.

It is not planned for any classes to be recorded, but there may arise exceptional circumstances in which recording would make sense. In that case, the following will apply.

Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voice recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials by students or any other party is prohibited.

Course 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, separability.
- 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.

- Week 15 : Review, discussion.

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 of the 14 homework assignment 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:

Grades: A=90-100, A-=87-89, B+=83-86, B=78-82, B-=75-77, C+=70-74, C=65-69, C-=60-64, D=50-59, E=0-49

If you think that a score has been **computed incorrectly**, please bring the matter to my attention within one day of your work being returned.

If you think that your work has been **graded incorrectly**, please submit an appeal in writing within seven days of your work being returned, explaining your reasons in detail. Appeals may result in a higher, unchanged, or lower score, depending on the merit of the appeal. Decisions on appeals are final. The final exam cannot be appealed.

Grading will be in accord with the UF policy stated at

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

The UF policy on attendance is

here: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

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/>

Honor Code

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 (<http://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 obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor of this class.

Course Evaluations

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/>.

