

# Math 505 - Abstract Algebra

## Galois Theory

---

**Instructor:** Sheng-Chi Liu

**Office:** Neill 207

**Email:** [scliu@math.wsu.edu](mailto:scliu@math.wsu.edu)

**Phone number:** (509)335-8648

**Webpage:** <http://www.math.wsu.edu/faculty/scliu>

---

**Time:** Tu,Th 12:00 - 1:15 pm

**Office Hours:** Tu, Th 1:20pm-2:20pm and by appointment

**Textbook:**

*Algebra* by Serge Lang, Graduate Texts in Mathematics, vol. 211, Springer-Verlag.

**Number of credits:** 3

**Prerequisites:** Math 421 or equivalent.

---

**Course Description:** We cover the basics of modern algebra that focus on modules, field extensions, Galois theory, advanced topics in linear algebra, and selected topics from commutative algebra. Some basic theory on groups and rings will be reviewed.

**Weekly Schedule:**

**Part I: Groups, Rings and Modules**

**Week 1-2:** Basic group theory, Sylow theorems, group actions, nilpotent and solvable groups

**Week 3-4:** Basic rings and modules theory

**Part II: Fields and Galois Theory**

**Week 5:** Field extensions

**Week 6:** Splitting fields

**Week 7:** Fundamental Theorem of Galois Theory

**Week 8:** The Galois group of a polynomial

**Week 9:** Finite fields

**Week 10:** Separability

**Week 11:** Cyclic extensions

**Week 12:** Cyclotomic extensions

**Week 13:** Radical extensions

**Part III: Commutative rings and modules**

**Week 14-15:** Noetherian rings and modules, Dedekind domains

**Grading Policy:** The components contributing to your grade in the course are weighted as follows: class participation (30%), homework(40%), and final presentation(30%).

**Homework:** There will be regular homework assignments. It is fine for students to work together on finding solutions for these problems. However, each student must write up the solutions on his or her own. Consulting web sites or other problem solution sources (other than the textbook) is not allowed.

**Learning outcomes:** Students will have a better understanding on the modern development of modern algebra and its connection with other fields.

**Absences:** Making up missed work (including exams, homework, etc) will be arranged only with prior approval or in case of illness documented by a doctor's note. If you miss a lecture, you are responsible for obtaining lecture notes from another student. You are also responsible for determining if any announcements were made.

**Students with Disabilities:** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call your campus resource to schedule an appointment. All accommodations MUST be approved through the campus resource. For more information contact a Disability Specialist on your campus: Pullman or WSU Online: 509-335-3417, Washington Building 217, Access.Center@wsu.edu, accesscenter.wsu.edu

**WSU Academic Integrity:** Academic integrity is the cornerstone of higher education. As such, all members of the university community share responsibility for maintaining and promoting the principles of integrity in all activities, including academic integrity and honest scholarship. Academic integrity will be strongly enforced in this course. Students who violate WSUs Academic Integrity Policy (identified in Washington Administrative Code (WAC) 504-26-010(3) and -404) will receive fail the course, will not have the option to withdraw from the course pending an appeal, and will be reported to the Office of Student Conduct. Cheating includes, but is not limited to, plagiarism and unauthorized collaboration as defined in the Standards of Conduct for Students, WAC 504-26-010(3). You need to read and understand all of the definitions of cheating: <http://app.leg.wa.gov/WAC/default.aspx?cite=504-26-010>. If you have any questions about what is and is not allowed in this course, you should ask course instructors before proceeding. If you wish to appeal a faculty member's decision relating to academic integrity, please use the form available at [conduct.wsu.edu](http://conduct.wsu.edu).

**Safety and Emergency Notification:** Classroom and campus safety are of paramount importance at Washington State University, and are the shared responsibility of the entire campus population. WSU urges students to follow the Alert, Assess, Act, protocol for all types of emergencies and the Run, Hide, Fight response for an active shooter incident. Remain ALERT (through direct observation or emergency notification), ASSESS your specific situation, and ACT in the most appropriate way to assure your own safety (and the safety of others if you are able).

Please sign up for emergency alerts on your account at MyWSU. For more information on this subject, campus safety, and related topics, please view the FBI's Run, Hide, Fight video and visit the classroom safety page [provost.wsu.edu/classroom-safety](http://provost.wsu.edu/classroom-safety).