

INDIANA STATE UNIVERSITY  
 Syllabus  
 MATH 603  
 ONLINE  
 Fundamental Concepts of Algebra—Galois Theory  
 Summer I 2019, MAY 20- AUGUST 2, 2019

**Faculty Contact Information**

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**Purpose of the Course and General Learning Outcomes**

A graduate course in modern algebra focusing on those parts of algebra that lead to Galois Theory.

Tentative Schedule of Topics

Module 1	complex numbers, subfields and subrings of the complex numbers, solving equations, solutions by radicals, polynomials, the fundamental theorem of algebra
Module 2	the Euclidean algorithm, irreducibility, Gauss' lemma, Eisenstein's criterion, reduction modulo $p$ , zeros of polynomials field extensions, simple extensions, algebraic and transcendental extension, minimal polynomials
Module 3	field extensions, simple extensions, algebraic and transcendental extension, minimal polynomials, the degree of an extension, compass and straight-edge constructions, constructions in $\mathbb{C}$ , impossibility proofs
Module 4	Galois groups, polynomials and extensions, the Galois correspondence (intro), splitting fields, normality, separability, counting principles
Module 5	field automorphisms, normal closures, the fundamental theorem of Galois theory, soluble groups, simple groups Cauchy's theorem, radical extensions, an insoluble quintic
Module 6	Cauchy's theorem, radical extensions, an insoluble quintic
Module 7	abstract rings and fields, polynomials over general rings, characteristic of a field, integral domains, minimal polynomials, simple algebraic extensions, splitting fields, normality, separability
Module 8	Galois theory for abstract fields, the general polynomial equation: transcendence degree, elementary symmetric polynomials, cyclic extensions, solving equations of degree four or less,
Module 9	finite fields, the multiplicative group, regular polygon constructions (which are possible), fifth roots revisited, cyclotomic polynomials, Galois group of $\mathbb{Q}(\zeta): \mathbb{Q}$ , more constructions
Module 10	calculating Galois groups, general algorithm for the Galois group, algebraically closed fields
Module 11	ordered fields and their extensions, Sylow's theorem, transcendental numbers

## Communication Policy

Please understand that I am not on-call 24/7. You can expect responses to your inquiries based on the following guidelines:

- You should check your ISU email daily to stay current and avoid missing any important announcements or other correspondence. Missing important communications may jeopardize your success in the course. You should always email from your ISU email.
- Before emailing a question, you should consult the Syllabus, Blackboard site, textbook, and other available resources. You will find many answers among the sources provided.
- I will answer emails within 48 hours (probably sooner). If you haven't heard from me within 48 hours, please resend your email. Sometimes messages go electronically astray or I think I've responded when I have not.
- When you send me an email, please do **not** address me as "Mrs. Brown." You may address me as "Dr. Brown," "Professor Brown," or Liz.
- You must send course-related email from your ISU email. Please include the following information in your email: your name, which class you are in (MATH 603), and the subject of your message in the subject line.
- The easiest and most efficient way to get ahold of me is email. However, sometimes a phone conversation can avoid a lot of back and forth over email, so when appropriate, we can schedule a phone call.

## Required Materials

- **Computer:** You must have a computer and high speed internet access. You must have a working microphone and webcam. You need to be able to access Microsoft Word and Excel (available through the Office of Information Technology) as well as other software available through OIT.
- **Text:** *Galois Theory, 4<sup>th</sup> Edition* by Ian Stewart. ISBN: 1482245825
- **Printer and camera/scanner:** You will need to print worksheets that you will write on and then take a picture or scan to upload to blackboard. Detailed instructions can be found in Blackboard.
- **Other Supplies:** You may need other supplies that will be indicated in the weekly modules.

## Technology Help

As a member of this learning community, you are expected to have basic computer skills, take responsibility for using appropriate hardware and software, and have a general understanding of how to use Blackboard, plug-ins, etc. Technical problems will not serve as a valid excuse for a missed or late assignment.

Please inform me as soon as you know there is an issue. I may be able to assist you, otherwise, the Office of Information Technology (OIT) offers many resources to assist with your

technology needs. First, you can use a self-help tool available through the [MyISU Portal](#) as well as on the [OIT website](#). Here you have direct access to the OIT [Knowledge Base](#) with up-to-date information about common errors, problems, and issues within Blackboard and other supported technologies. Think of this as an FAQ resource. Simply log into the MyISU Portal and click on the **Help Desk Self-Service** badge available in the Workspace tab to browse the categories.

You can also submit a help desk ticket through the [OIT website](#) or via the [Submit a Ticket](#) link within the **Help Desk Self-Service** in the Workspace tab in the [MyISU Portal](#). By defining in detail your problem with the drop-down selections available, your ticket will be routed directly to the group or individual who can best assist you. As you are typing your ticket, Knowledge Base articles may be presented to you that may help you resolve your issue without having to create a ticket in the first place.

If you are wondering about the status of a ticket that you currently have open with OIT, you can click on the **My Tickets** link within the **Help Desk Self-Service** in the Workspace tab in the [MyISU Portal](#) to view your history. You can use this mechanism to track progress or to add information to the ticket yourself.

If you have a specific Blackboard concern, please contact **Instructional Tools**:

Phone: 812-237-7000

Email: [isu-blackboard-support@mail.indstate.edu](mailto:isu-blackboard-support@mail.indstate.edu)

Or contact the **OIT Help Desk** directly for general technology help:

Phone: 812-237-2910 or 888-818-5465

Email: [IT-Help@indstate.edu](mailto:IT-Help@indstate.edu)

## Course Requirements and Grading

Your grade in the course will be based on the following items:

**Written Assignments (90%):** You will be given written assignments each week that you will print, handwrite, and scan (or photograph) and put into a Word document for submission. These written assignments will include problem solving and proofs. You will also create drawings and models that will help illustrate important ideas and relationships.

**Discussions (10%):** There will be weekly discussion boards. You are expected to post each week and respond to at least one of your classmates.

**Grading Scale:** Following is an approximate grading scale used for this course.

A+	97 – 100%	B-	80 – 82%
A	93 – 96%	C+	77 – 79%
A-	90 – 92%	C	73 – 76%
B+	87 – 89%	C-	70 – 72%

B 83 – 86%

F Below 70%

**Academic Honesty:** It is imperative that you adhere to standard practices of academic honesty and integrity in this course. This includes, but is not limited to, turning in your own work. If you receive help on an assignment, acknowledge the helper and NEVER just copy the work of another person. Plagiarism will not be tolerated and you must cite references appropriately. I encourage you to review the University's Academic Dishonesty Policy found in the Student Code of Conduct (see <http://www.indstate.edu/sjp/docs/code.pdf>).

**American with Disabilities Act Statement:** “Indiana State University recognizes that students with disabilities may have special needs that must be met to give them equal access to college programs and facilities. If you need course adaptations or accommodations because of a disability, please contact us as soon as possible in a confidential setting either after class or in my office. All conversations regarding your disability will be kept in strict confidence. Indiana State University's Student Support Services (SSS) office coordinates services for students with disabilities: documentation of a disability needs to be on file in that office before any accommodations can be provided. Student Support Services is located on the lower level of Normal Hall in the Center for Student Success and can be contacted at 812-237-2700, or you can visit the ISU website under A-Z, Disability Student Services and submit a Contact Form. Appointments to discuss accommodations with SSS staff members are encouraged.”

**Sexual Misconduct Policy:** Indiana State University fosters a campus free of sexual misconduct including sexual harassment, sexual violence, intimate partner violence, and stalking and/or any form of sex or gender discrimination. If you disclose a potential violation of the sexual misconduct policy I will need to notify the Title IX Coordinator. Students who have experienced sexual misconduct are encouraged to contact confidential resources listed below. To make a report to the Title IX Coordinator, visit the Equal Opportunity and Title IX website: <http://www.indstate.edu/equalopportunity-titleix/titleix>.

Confidential Resources:

The ISU Student Counseling Center – HMSU 7<sup>th</sup> Floor; 812-237-3939;  
[www.indstate.edu/cns](http://www.indstate.edu/cns)

The ISU Victim Advocate – Leah Reynolds; HMSU Room 813; 812-237-3829(office); 812-243-7272; [leah.reynolds@indstate.edu](mailto:leah.reynolds@indstate.edu)

Campus Ministries - <http://www2.indstate.edu/sao/campusinistries.htm>;

For more information on your rights and available resources:  
<http://www.indstate.edu/equalopportunity-titleix/titleix>