Math 5360, Section 01: Special Topics: Representations of Groups and Algebras
Spring 2014 Syllabus

1 Course Information

- Location and Time: MW 3:00–4:20pm, 205 Lee Drain Building
- Professor: Dr. Martin Malandro
- Department: Mathematics and Statistics
- Office: 409 Lee Drain Building
- E-mail (preferred method of contact): malandro@shsu.edu
- Phone number: (936) 294–1580
- Office Hours: Th 2:00–5:00pm, and by appointment
- Required Materials:
  - Textbook: Representation Theory of Finite Groups: An Introductory Approach (Universitext), by Benjamin Steinberg. Other readings will be posted to the course BlackBoard page.

Catalog Course Description: Topics and courses are selected to suit individual needs of students. Methods of independent study and research are stressed. The course may be repeated for additional credit. Credit 3.

Course Objectives/Learning Outcomes: This course will cover the representation theory of finite groups and finite-dimensional algebras. The course will build on your knowledge of vector spaces, group theory, and ring theory, and will include applications to structure theorems and applied harmonic analysis. While other topics will also be covered, a successful student will attain mastery of the following topics.

- Group representations: Basic definitions and properties
- Character theory and the orthogonality relations
- Wedderburn's theorem
- Properties of Fourier transforms on finite groups
- Fast Fourier transforms (FFTs) for cyclic and symmetric groups
- Applications of FFTs for cyclic and symmetric groups
- The representation theory of the symmetric group
- Random walks on groups

2 Grading Policy

Your grade in this course will be based on the following items.

Attendance and participation	10%
Homework	50%
Midterm Exam	20%
Final Exam	20%

I expect you to treat this class as a professional obligation. If you need to miss class, please e-mail me.

Grading Scale:

A	90% or better final average
B	80–89% final average
C	70–79% final average
D	60–69% final average
F	59% or lower final average

Academic Honesty Policy: For homework, you may consult any source you wish. **However,** if you consult any source other than me or your textbook, you must acknowledge it in your homework write-up. This includes working with other students in the class—if you collaborate with another student in the class on a homework problem, please acknowledge them in your solution.

All work that you turn in in this class *must be written alone, in your own words.* Turning in work that is copied from others is cheating. Here is a good guideline for avoiding cheating when working with others: Anything you write down together should be erased or thrown away before you go off on your own to write up the work you'll turn in for credit.

Exams are individual endeavors, where no help is to be given or received. For take-home exams, the only sources you may consult are me and your textbook.

Cheating is punishable with an F in the course and a referral to the Dean of Students on academic dishonesty charges.

Homework: I will assign written homework on a regular basis. Here are some guidelines for writing up your homework.

- Write legibly! Using LaTeX(the industry standard for mathematical typesetting) is optional, but encouraged. If you turn in sloppy homework, you will receive a warning. If you do it again, I will require that all future work you turn in in the class be typeset with LaTeX.
- Write on only one side of the paper.
- State all claims you intend to prove and justify all your calculations. Write up each problem in such a way that the reader does not need the textbook to understand the problem statement or its solution. You may (and should!) state problems in your own words.
- Don't use paper with ragged edges (like paper torn from a spiral).
- Staple your papers together in the correct order.
- Most importantly, you must write up your work *by yourself, in your own words.*

Exams: The take-home midterm exam will essentially be a homework-style assignment covering the first half of the course that you will have to complete on your own. There will also be a brief cumulative in-class final exam.

Make-up policy: Barring exceptional documented circumstances, no make-ups for missed homework assignments or exams will be available.

Grade Dispute Policy: All grade issues need to be brought to my attention within one week of having your grade returned/posted.

Final Exam Schedule: Wed May 7, 5pm–7pm

3 Classroom Policies

Attendance Policy: I expect you to attend every class. If you miss a class, then I expect you to email me and get the notes from a classmate. I expect you to arrive to class on time.

Classroom Rules of Conduct: Students must refrain from behavior in class that disrupts the learning process. Students are prohibited from using tobacco products in class, making offensive remarks, reading newspapers, sleeping, talking at inappropriate times or about inappropriate things, wearing inappropriate clothing, using cellphones, or engaging in any other form of distraction. Inappropriate behavior in the classroom shall result in a directive to leave class. Students who are especially disruptive also may be reported to the Dean of Students for disciplinary action in accordance with university policy.

Use of Telephones and Text Messengers in Class: Generally speaking, you may not use cell phones, computers, or other devices capable of communication in class. The one exception is that during lecture periods, you may keep your cell phone on vibrate so that you can receive text messages in case of an emergency. You may not, however, be distracted or distracting to others in checking your text messages in class, and you may not send text messages in class. All messengers must be put away for exams. SHSU Academic Policy Statement 100728 states that *even the visible presence of such a device during the test period will result in a zero for that test. Use of these devices during a test is considered de facto evidence of cheating and could result in a charge of academic dishonesty.* I have no choice in this matter, so if your phone goes off during a test, please don't answer it or even pull it out to look at it.

4 Tentative Schedule

Basic representation theory, Fourier transforms, and FFTs	Jan 15–Mar 7
Spring break	Week of March 10–14
Midterm Exam (take home)	To be assigned on or around Mar 19
FFT applications, representations of the symmetric group, random walks, additional topics	Mar 17–May 2
Final Exam	Wed May 7, 5pm–7pm

The date/time of the final exam is set by official SHSU policy. All other dates in this list are tentative and subject to change.

5 Additional Information

All information on this syllabus is subject to change. All changes will be announced in class. Further university policies regarding academic dishonesty, student absences on religious holy days, disabilities, and visitors in the classroom which apply to this course may be found at http://www.shsu.edu/syllabus/. If there is a conflict between information on this syllabus and official university policy, university policy takes precedence.