Policy Sheet

Course  Math 5114, Specialized Topics in Algebra CRN (index number) 14528
Prereq  Math 4124 (Introduction to Abstract Algebra)
Instructor  Peter A. Linnell
Book  Groups and Symmetries by Yvette Kosmann-Schwarzbach,
      ISBN 978-0387788654
Office  McBryde 516
Telephone  231-2764 and 951-5279
E-mail  plinnell@math.vt.edu
Room  McBryde 318 at 10:10 a.m., MWF

Office Hrs  Mon, Wed 11:05 a.m. to 12:00 p.m.
            (Tentative!) Mon, Tues, Wed, Thur 2:30 p.m. to 3:00 p.m.
            Fri, 11:05 a.m. to 11:30 a.m. and 3:00 p.m. to 3:30 p.m.
In case of difficulty, try office at other times, or make an appointment, or telephone me, or
E-mail me. E-mail is a good method of contacting me.

Webpages  You will find my webpage for this course at
          http://www.math.vt.edu/people/plinnell/5114/
On this webpage I will put announcements, handouts which I have previously distributed in
class, useful links, class roll and grades. To access the class roll and grades, you will need
your Virginia Tech ID number and a password which I will give you. Most handouts I will
post on my webpages in HTML format (for immediate online viewing) and PDF format (for
better quality viewing or printing).

Assessment  Two 50 minute tests, 50 points each
            One two hour exam, 100 points
            Homework, 150 points
            Total: 350 points

Tests  will be on Monday February 25 and Monday April 8
The final exam is on Monday May 13, 10:05 a.m.–12:05 p.m. in the regular classroom
McBryde 318 (i.e. as according to the “Spring Timetable of Classes”).
I will grade according to the following scale:

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<thead>
<tr>
<th>Grade</th>
<th>Points</th>
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<tbody>
<tr>
<td>A</td>
<td>320–350</td>
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<tr>
<td>A–</td>
<td>307–319</td>
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<tr>
<td>B+</td>
<td>294–306</td>
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<td>B</td>
<td>281–293</td>
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<tr>
<td>B–</td>
<td>268–280</td>
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<td>C+</td>
<td>255–267</td>
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<td>C</td>
<td>242–254</td>
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<td>C–</td>
<td>229–241</td>
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<td>D+</td>
<td>216–228</td>
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<td>D</td>
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<tr>
<td>D–</td>
<td>190–202</td>
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<td>F</td>
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Homework  You may (are even encouraged) to discuss homework between yourselves;
however copying is, of course, forbidden. Homework which is handed in late will receive at
most half credit (zero credit if received after I have given out solutions to the class).
Tests  These will be fairly traditional, so in particular they will be closed book.

Make-ups  There will be no make-ups. If it is impossible for a student to take a test, the part of the exam corresponding to the missed test will be weighted more heavily. The student must obtain my permission before the test to use this option.

Syllabus and Objectives  Math 4124 (Introduction for Abstract Algebra) is the prerequisite, however a course in real analysis (e.g. Math 4225/6) or topology would be a helpful. This course is an introduction to Lie groups and their representations. Lie groups is a fairly sophisticated subject; however one can make much progress thinking them as just groups of matrices. A representation of a group is a homomorphism of the group into a group of matrices. It turns out that finding all representations of a group is important, and is of interest to physicists.

Hopefully a substantial amount of the textbook will be covered. More precisely

1. Chapter 1, we’ll mainly skip this, because most of it should have been covered in Math 4124. However I may review parts of it.

2. Chapter 2, we’ll cover all of this chapter, which studies representations of finite groups.

3. Chapter 3, we’ll hopefully cover all of this chapter, which deals with representations of compact groups. In some sense, a compact group is a generalization of a finite group.

4. Chapter 4, hopefully we’ll at least start this chapter. Given a Lie group, one can associate to it a Lie algebra, so here we’ll learn a bit about Lie algebras.

5. Later chapters if there is time.

Notation

\(\mathbb{Z}\) integers  \(\mathbb{Q}\) rational numbers
\(\mathbb{R}\) real numbers  \(\mathbb{C}\) complex numbers
\(\mathbb{N}\) positive integers  \(1, 2, \ldots\) (excludes 0)
\(\cup\) union  \(\cap\) intersection
\(\in\) is an element of  \(\notin\) is not an element of
\(\subseteq\) is a subset of  \(A \setminus B = \{a \in A \mid a \notin B\}\)
\(\emptyset\) empty set  iff = if and only if
\(\forall\) for all  \(\exists\) there exists
\(\leq\) subgroup  \(\unlhd\) normal subgroup
\(\ker\) = kernel  \(\cong\) = is isomorphic to
\(|S|\) = order of \(S\)  \(|G:H|\) = index = \(|G|/|H|\)
\(A^t\) = transpose of \(A\)  \(A^* = A^\ast\) = adjoint of \(A\)
\(\text{GL}(n, \mathbb{K}) = n \times n\) invertible matrices, entries in field \(\mathbb{K}\)