

SYLLABUS – MAT 552
LIE GROUPS AND LIE ALGEBRAS
Spring 2015

This course will be an introduction to the theory of Lie groups, Lie algebras and their representations.

1. *The Basic Theory of Lie Groups:* One-parameter subgroups, the exponential map, adjoint maps, the abelian case.
2. *Closed subgroups are Lie Subgroups.*
3. *Riemannian Structures:* Applications to compact Lie Groups.
4. *Elementary Representation Theory for Compact Lie Groups:* Shur's Lemma, the Representation Ring, Characters, Peter-Weyl theorem, Representations of T^n and $SU(2)$.
5. *The Maximal Torus Theorem:* The Weyl Group, Implications for representations, Regular and singular elements.
6. *Weyl chambers, Roots, Dynkin Diagrams.*
7. *The Weyl Integration Formula.*
8. *The General Theory of Lie Algebras:* Engel's Thm., Lie's Thm., Cartan's Criteria.
9. *Classification of Complex Simple Lie Algebras.*

Disability Support Services: If you have a physical, psychological, medical, or learning disability that may affect your course work, please contact Disability Support Services (DSS) office: ECC (Educational Communications Center) Building, room 128, telephone (631) 632-6748/TDD. DSS will determine with you what accommodations are necessary and appropriate. Arrangements should be made early in the semester (before the first exam) so that your needs can be accommodated. All information and documentation of disability is confidential. Students requiring emergency evacuation are encouraged to discuss their needs with their professors and DSS. For procedures and information, go to the following web site <http://www.ehs.sunysb.edu> and search Fire safety and Evacuation and Disabilities.

Academic Integrity: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on

academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>.

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, and/or inhibits students' ability to learn.