Math 70220 **Spring 2016**

Lie Groups

Approximate Schedule

Jan 13	Some Differential Manifolds, Definition of Lie Groups, The Lie Algebra of a Lie Group
15	Classical Examples of Lie Groups: Orthogonal, Unitary, Quarternions and Symplectic Groups
18	Left-Invariant Vector Field and One-Parameter Groups
20	Exponential Maps: From Lie algebras to Lie Groups
22	Adjoint Representations and Jacobi Identity
25	Lie's Fundamental Theorems
27	Group Actions and Homogeneous Spaces
29	Haar Measures on Lie groups
Feb 1	Invariant Integration
3	Representation of Compact Lie Groups: Basic Definitions
5	Complete Reducibility of Unitary Representations
8	Orthogonality Relations
10	Representations of $SU(2)$
12	Representations of $SO(3)$
15	Real, Complex and Quarternion Representations
17	Character Ring and Representation Ring
19	Representations of Abelian Groups
22	Representations of Lie Algebras
24	The Lie algebra $\mathfrak{sl}(2,\mathbb{C})$
26	Algebras of Representative Rings
29	Some Analysis on Compact Groups
Mar 2	Peter-Weyl Theorem
4	Application of Peter-Weyl Theorem
7	
9	*Spring Break*
11	
14	Induced Representation
16	Reconstruction: Tannaka-Kreĭn Duality
18	Some Algebraic Groups
21	Complexifications
23	Maximal Tori, Weyl Groups
25	*Easter Break*
28	*Easter Break*
30	Conjugation Theorem
April 1	Applications of the Conjugation Theorem
4	Maximal Tori and Weyl Groups of the Classical Groups
6	Classification of Groups of Rank 1
8	Roots and Weyl Chambers
11	Root Systems
13	Cartan Matrices and Dynkin Diagrams
15	Classification Theorem
18	Roots of the Classical Groups
20	Weyl Character Formula
22	Proof of the Weyl Character Formula
25	Dominant Weights and the Structure of the Representation Rings
27	Multiplicity Formulas