

Subjects and their Motivations

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0.1 Algebraic Geometry

- Planning on two courses
- Hartshorne, *Algebraic Geometry*
- Mumford, *Red Book of Varieties and Schemes*
- Harris, *Geometry of Schemes*

0.2 Algebraic Groups

- Borel, *Linear Algebraic Groups*

0.3 Algebraic Topology

- Planning on two courses
- May, *Concise Course in Algebraic Topology*
- Greenberg and Harper, *First course in Algebraic Topology*
- Lecture notes on Algebraic Topology

0.4 Representation Theory

0.5 Functional Analysis

- Rudin, *Functional Analysis*
- Theo Buller, *Functional Analysis*
- Folland, *Real Analysis*
- Conway, *Course in Functional Analysis*

0.6 Operator Algebras/Operator Theory

0.7 Differential Geometry

- Two courses
- Vaisman, *Cohomology and Differential Forms*
- Wodziki, *Differential Calculus*

0.8 K-Theory

- Hilmöller, *Fibre Bundles*
- Hatcher, *Vector Bundles and K-Theory*
- Steenrod, *Topology of Fibre Bundles(?)*

0.9 Lie Groups

- Bump, *Lie Groups*

0.10 Complex Manifolds and Geometry

0.11 Quantum Groups

- Kaessel, *Quantum Groups*

0.12 Sheaves

- Kashiwara & Schpira, *Sheaves on Manifolds*
- *Sheaves in Topology*

0.13 More Homological Algebra

- Weibel, *Introduction to Homological Algebra*

0.14 Category Theory

- Kashiwara & Schpira, *Categories and Sheaves*
- MacLane, *Categories for the Working Mathematician*
- *Geometry and Categorification*

0.15 Quantum Complexity Theory

0.16 Topological Quantum Computation

0.17 General Complexity Theory

0.18 Additive Combinatorics

0.19 Approximate Representation Theory

- CS Motivation and Survey

0.20 Expanders

0.21 Proof Systems