

Quantum Invariants

Trinity Term 2011

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Course Time: TR11-12:30
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Course Location: SGSR1
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Course Outline

Tues.	3 May	Classical perspectives on 2-dimensional TQFTs.
Thurs.	5 May	Classical perspectives on 3-dimensional TQFTs.
Tues.	10 May	Modular tensor categories, Hopf algebras, and quantum groups, I.
Thurs.	12 May	Modular tensor categories, Hopf algebras, and quantum groups, II.
Tues.	17 May	Physical motivations for topological field theory.
Thurs.	19 May	Local field theory and the cobordism hypothesis.
Tues.	24 May	Local field theory in dimension 2.
Thurs.	26 May	Local field theory in dimension 3.
Tues.	31 May	Categorified quantum groups, I.
Thurs.	2 June	Categorified quantum groups, II.
Tues.	7 June	The Jones polynomial.
Thurs.	9 June	Khovanov homology, I.
Tues.	14 June	Khovanov homology, II.
Thurs.	16 June	Khovanov homology of 4-manifolds.
Tues.	21 June	Heegaard-Floer homology, I.
Thurs.	23 June	Heegaard-Floer homology, II.

References for topological field theory.

Kock, *Frobenius algebras and 2D topological quantum field theories.*

Ohtsuki, *Quantum invariants: a study of knots, 3-manifolds, and their sets.*

Turaev, *Quantum invariants of knots and 3-manifolds.*

References for local field theory.

Lurie, *On the classification of topological field theories.*

Morrison-Walker, *The blob complex.*

References for Khovanov homology.

Bar-Natan, *Khovanov's homology for tangles and cobordisms.*

Bar-Natan, *On Khovanov's categorification of the Jones polynomial.*

Khovanov, *A categorification of the Jones polynomial.*

[References for categorified quantum groups and for Heegaard-Floer homology will be added later, depending on the evolution of the course.]