

SMSTC, Structure and Symmetry

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Each of these fields offers unique insights and tools for understanding mathematical concepts!

do you think that there exist hyperbolic groups that are not residually finite?

Yes, there do exist hyperbolic groups that are not residually finite. Residually finite groups have the property that every non-trivial element can be distinguished from the identity by a homomorphism to a finite group. While many hyperbolic groups are residually finite, there are known examples of hyperbolic groups that fail this property.

A notable example is the free group on two generators, which is hyperbolic and not residually finite. The existence of such groups highlights the rich structure of hyperbolic groups and the variety of properties they can exhibit. If you'd like more details or examples, feel free to ask!

Theme overview

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Semester 1

★ Algebraic Geometry

- Clark Barwick, University of Edinburgh
`Clark.Barwick@ed.ac.uk`

★ Differential Topology

- Murad Alim, Heriot-Watt University
`murad.alim@uni-hamburg.de`

Theme overview

Semester 1

★ **Algebraic Geometry**

- Clark Barwick, [University of Edinburgh](#)
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★ **Differential Topology**

- Murad Alim, [Heriot-Watt University](#)
murad.alim@uni-hamburg.de

Supplementary Modules (separate presentations)

★ **Conformal Field Theory and Vertex Operator Algebras**

- Anatoly Konechny, [Heriot-Watt University](#)
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★ **Riemann Surfaces and their associated Moduli Spaces**

- Vaibhav Gadre, [University of Glasgow](#)
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★ **Topological quantum field theory**

- Pavel Safronov, [University of Edinburgh](#)
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Theme overview

Semester 2

★ **Representation Theory**

- Christian Korff, [University of Glasgow](#)
Christian.Korff@glasgow.ac.uk

★ **Algebraic Topology**

- Gwyn Bellany, [University of Glasgow](#)
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★ **Representation Theory**

- Christian Korff, [University of Glasgow](#)
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★ **Algebraic Topology**

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Gwyn.Bellany@glasgow.ac.uk

Supplementary Modules (separate presentations)

★ **Gravity**

- Sayantani Bhattacharya, [University of Edinburgh](#)

★ **Holography**

- Matthew Walters, [Heriot-Watt University](#)
M.Walters@hw.ac.uk

Prerequisites

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- ▶ The notion of a module and related concepts.
- ▶ Basics on noetherian and artinian modules.
- ▶ Some commutative algebra, e.g. the notion of principal ideal domain.

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★ Differential Topology

- ▶ Multivariable calculus.
- ▶ Point-Set Topology.
- ▶ First course in Differential Geometry, for example on curves and surfaces.

Note: If you're interested in a course, but worried about prerequisites, please contact the lecturer(s).

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 - Definitions and examples of groups, rings and fields.
- ▶ Basic notions of group theory.
 - Lagrange's theorem, normal subgroups and factor groups.

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★ Algebraic Topology

- ▶ A course in metric spaces or topological spaces. (Usually negotiable.)
- ▶ A course in group theory.
 - Group actions.
 - Finitely generated abelian groups.

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- (4) vector bundles, (quasi-)coherent sheaves and sheaf cohomology.

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- (6) Introduction to Chern-Weil theory and characteristic classes

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 - ▶ Tensor products, Maschke's theorem and (lots of examples of) characters.
- Representations of the symmetric group and the general linear group.
 - ▶ Young diagrams
 - ▶ Schur-Weyl duality
 - ▶ Outlook on further aspects.

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Enjoy the Theme!