School of Mathematics

Course 445 — Group Theory and Topology in Physics 2000–01
(JS & SS Theoretical Physics
JS & SS Mathematics)

Lecturer: Dr Conor Houghton

Requirements/prerequisites: 241, 441 at least concurrently.

Duration: 21 weeks

Number of lectures per week: 3

Assessment: Regular assignments

End-of-year Examination: One 3 hour examination

Description: This is a course in mathematical methods in theoretical particle physics. There will be three main sections. The first will be a description of the Lorentz and Poincare groups and their representations. The next part of the course will concentrate on differential geometry with an introduction to homology and cohomology groups. The final part of the course will deal with Lie groups and Lie algebras and their classification. There will be a discussion of the application of this to global and local symmetries in particle physics.

More detailed information, problems sheets and notes are available at
`http://www.maths.tcd.ie/~houghton/445.html`.

Objectives: This course aims to introduce the mathematical methods that are important in theoretical particle physics.

Textbooks:

1. C. Nash and S. Sen, Topology and Geometry for Physicists
2. M. Nakahara, Geometry, Topology and Physics
3. J.E.Cornwell, Group Theory in Physics, Vols I and II
4. Howard Georgi, Lie Algebras in Particle Physics
5. Wu-Ti Tung, Group Theory in Physics

October 9, 2001