

# LTCC Advanced Course

## **Title: Foliations and 3-dimensional manifolds**

### **Basic Details:**

- Core Audience: Students in pure mathematics
- Course Format: 5 x 2hr lectures

### **Course Description:**

- Keywords: foliations, taut foliations, 3-manifolds, sutured 3-manifolds, Thurston norm,
- Syllabus: (1) - Basics of foliations and examples, operations for modifying foliations, holonomy, Reeb stability theorem, (2) – every 3-manifold admits a foliation (Novikov—Zieschang, Lickorish), equivalent definitions of taut foliations (Sullivan), no torus leaf implies taut (Goodman), (3) - prime decomposition of 3-manifolds (Kneser, Milnor), taut foliation implies prime (Novikov—Rosenberg), taut foliation implies infinite fundamental group (Novikov), (4) - sutured manifolds, sutured manifold hierarchy, taut foliations from sutured manifold hierarchies (Gabai), (5) – knot genus and Thurston norm, compact leaves of taut foliations are Thurston norm-minimising (Thurston), Thurston’s structure theory for fibrations of a 3-manifold over the circle
- Recommended reading:
  - (1) - Geometric Theory of Foliations, C. Camacho and A. L. Neto, Birkhouser (Chapters II-VII)
  - (2) - Foliations and the Geometry of 3-manifolds, D. Calegari, Oxford University Press (Chapters 4 and 5)
  - (3) - Foliations II, A. Candel and L. Conlon, AMS Graduate Studies in Mathematics (Two chapters: Foliations and the Thurston norm, Disk Decompositions and Foliations of Link Complements)
- Prerequisites: Elementary topology

### **Format:**

- No of discussion/problem sheets: 4 problem sheets
- Electronic lecture: I will aim to prepare the notes before the start of the class
- There will be plenty of pictures 😊.

### **Lecturer Details:**

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