



## **EC303 and PH303 Aug 2:1**

### **Spatial dynamic in biology**

#### **Instructor**

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Email:

**Department: Centre for Ecological Sciences and Physics**

Course Time:

Lecture venue:

Detailed Course Page:

### **Announcements**

#### **Brief description of the course**

This course will cover topics on spatial dynamics in biology that will have applications to various topics such as ecology of species to pattern formation in cellular systems.

#### **Prerequisites**

EC 201 or equivalent or Consent of instructor. Proficiency in basic concepts and nonlinear dynamical models of theoretical ecology

(e.g., EC 201), calculus and programming is assumed.

#### **Syllabus**

Single species dynamics in space with local vs long distance dispersal

(bifurcation theory; reaction diffusion & integro-differential equations,

Fisher Kolmogorov equation; Phase transitions).

Multi-species dynamics. Predator-prey and competition dynamics, and pattern

formations (Turing patterns, cellular automata, contact process, etc).

Self-organization in biological systems; swarm dynamics and intelligence

(agent based models; non-equilibrium statistical physics); evolutionary

games in space (basic game theory and adaptive dynamics).

### **Course outcomes**

This will train students to apply ideas from nonequilibrium statistical physics and stochastic processes to Biological systems. The course will also train towards presentation skills as well as research skills via an independent project that students would develop.

### **Grading policy**

Assignments (probably 4): 25%

Presentation: 20%

Short project: 40%

Class participation: 20%

### **Assignments**

### **Resources**