

### Content of the Course

The following topics will be covered:

- age-structured populations in continuous time, the McKendrick-von Foerster equation, solution by methods of characteristics, stage-structured models.
- age-structured and stage-structured population models in discrete time, matrix models for populations and life-history graphs, the Perron-Frobenius Theorem,  $z$ -transforms.
- Kermack-McKendrick models for disease transmission,  $R_0$ , epidemics in structured populations, vaccination policies.
- spatial spread of populations and epidemics, travelling waves.

### Course Assessment

- Completion of set exercises and participation in class discussion [10%]
- Short assignments [10%]
- Reading assignment [20%]
- Exam—Half hour closed book exam [10%], two hour open book exam (or possibly a take-home exam).[50%].

### Useful books

J.D. Murray *Mathematical Biology*, any edition, Springer.

Hal Caswell *Matrix Population Models* 2nd edition, 2001 Sinauer, Massachusetts

O. Diekmann and J.A.P. Heesterbeek *Mathematical Epidemiology of Infectious Diseases* 2000 John Wiley and Sons.