

Oral examination ST2302 / MA8002 Spring 2016.

The examination will last about 45 minutes for each student and will be in English or Norwegian according to the student's choice. Questions in ST2302 will have a larger focus on mathematics while MA8002 will be more focused on relating theory to biology. Questions will all be from the part of the compendium covered by the lectures. This is:

- Chapter 1 except 1.9.2.
- Chapter 2 except 2.7.3, 2.7.4 and 2.7.5.
- Chapter 3 except 3.15.2 and 3.16.
- Chapter 4 except 4.3.6, and 4.3.8.
- Chapter 5 except 5.3.4.

All students will first be given 5 minutes to present each of the three following topics (totally 15 minutes):

- A. Environmental and demographic stochasticity. Definitions and interpretations (5 minutes).
- B. Definition of diffusion processes. Approximation of discrete processes by diffusions, the Ito method (5 minutes).
- C. Definition, practical interpretation and major applications of the Green function (5 minutes).

Next, one of the 5 following topics will be drawn at random for approximately 15 minutes examination:

- I. Stochastic growth and modeling of deterministic and stochastic density-regulated populations, including the diffusion approximation.
- II. Transformations of diffusions, the ultimate probability of extinction, stationary distribution, examples of stationary distributions.
- III. Analysis of extinction processes in density-regulated populations as well as population that are not subject to density regulation.
- IV. Age-structured population dynamics, deterministic theory, stable age distribution, generation time, reproductive value, stochastic analysis, diffusion approximation.
- V. Population viability analysis taking uncertainty in parameters into account. Harvesting strategies. Quasi-stationary distribution and its application to analysis of harvesting strategies in stochastic models.

The rest of the time (to make the total approximately 45 minutes) may be used for questions on anything covered by the lectures.