Course Programme MSG800/MVE170 Basic Stochastic Processes, 7.5 credits, 2nd quarter Fall 2019

Responsible teacher. Patrik Albin, email palbin@chalmers.se

Teaching assistant/exercise teacher. Oskar Allerbo, email allerbo@chalmers.se

Course web-page. https://chalmers.instructure.com/courses/7357

Responsible university unit. Department of Mathematical Statistics, Mathematical Sciences, Chalmers Tvärgata 3. Expedition: Monday - Friday 11 am - 1 pm.

Prerequisites for the course (besides basic university level math and some computer programming) is basic probability theory from a first university level course in mathematical statistics.

Lectures. The course has 28 double lectures according to the schedule below. (The indicated content of lectures is approximative/preliminary.) Not all Thursday lecture times will be fully utilized but some will be canceled – when that happens students will be notified in advance orally on lecture time as well as with Canavas email.

Lectures	**Day**	**Time and place**	**Programme**
Lecture 1	Wednesday 6 November	8 - 9.45 am in KA	Crasch Course
Lecture 2	Wednesday 6 November	3.15 - 5 pm in KA	Crasch Course
Lecture 3	Thursday 7 November	8 - 9.45 am in KA	Ch. 5 in Hsu's book
Lecture 4	Thursday 7 November	10 - 11.45 am in KA	Ch. 5 in Hsu's book (cont.)
Lecture 5	Wednesday 13 November	8 - 9.45 am in KA	Ch. 5 in Hsu's book (cont.)
Lecture 6	Wednesday 13 November	3.15 - 5 pm in KA	Ch. 5 in Hsu's book (cont.)
Lecture 7	Thursday 14 November	8 - 9.45 am in KA	Ch. 5 in Hsu's book (cont.)
Lecture 8	Thursday 14 November	10 - 11.45 am in KA	Ch. 5 in Hsu's book (cont.)
Lecture 9	Wednesday 20 November	8 - 9.45 am in KA	Ch. 5 in Hsu's book (cont.)
Lecture 10	Wednesday 20 November	3.15 - 5 pm in KA	Ch. 5 in Hsu's book (cont.)
Lecture 11	Thursday 21 November	8 - 9.45 am in KA	Ch. 6 in Hsu's book
Lecture 12	Thursday 21 November	10 - 11.45 am in KA	Ch. 9 in Hsu's book
Lecture 13	Wednesday 27 November	8 - 9.45 am in KA	Ch. 9 in Hsu's book (cont.)
Lecture 14	Wednesday 27 November	3.15 - 5 pm in KA	Ch. 9 in Hsu's book (cont.)
Lecture 15	Thursday 28 November	8 - 9.45 am in KA	Ch. 6 in Hsu's book (cont.)
Lecture 16	Thursday 28 November	10 - 11.45 am in KE	Ch. 6 in Hsu's book (cont.)
Lecture 17	Wednesday 4 December	8 - 9.45 am in KA	Ch. 6 in Hsu's book (cont.)
Lecture 18	Wednesday 4 December	3.15 - 5 pm in KA	Ch. 6 in G-S's book
Lecture 19	Thursday 5 December	8 - 9.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 20	Thursday 5 December	10 - 11.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 21	Wednesday 11 December	8 - 9.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 22	Wednesday 11 December	3.15 - 5 pm in KA	Ch. 6 in G-S's book (cont.)
Lecture 23	Thursday 12 December	8 - 9.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 24	Thursday 12 December	10 - 11.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 25	Wednesday 18 December	8 - 9.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 26	Wednesday 18 December	3.15 - 5 pm in KA	Ch. 6 in G-S's book (cont.)
Lecture 27	Thursday 19 December	8 - 9.45 am in KA	Ch. 6 in G-S's book (cont.)
Lecture 28	Thursday 19 December	10 - 11.45 am in KA	Ch. 6 in G-S's book (cont.)

Literature. *Hwei Hsu: Probability, Random Variables, and Random Processes, 2nd Ed. 2010 or 3rd Ed. 2014. Schaum's Outlines, McGraw-Hill* and *Geoffrey Grimmett and David Stirzaker: Probability and Random Processes, 3rd Ed. 2001. Oxford University Press* are available from Cremona Chalmer's bookshop. List of Errata for Hsu's book available from the course web-page. Crasch course hand-out (stencil) on probability theory and math available from the course web-page.

Information about exercise material available from the course web-page.

While the book by Hsu is intended as a "learning book" the book by Grimmett and Stirzaker is more suitable as a reference book. It is therefore not only useful for learning Markov chains (as we use it to), but also for suplementary reading and reference purposes.

The book *Geoffrey Grimmett and David Stirzaker: One Thousand Exercises in Probability. Oxford University Press 2001* (also available from Cremona) contains solutions to the exercises in *Probability and Random Processes* and can thus be used for suplementary reading. However, the solutions that concern us occupy just 26 pages (13 sheets) in this book of its total 438 pages.

Contents of course. Chapter 5, Sections 6.1-6.5 and Chapter 9 in Hsu's book. Sections 6.1-6.5, 6.8-6.9 and 6.11 in the book by Grimmett and Stirzaker.

Exercises. The exercise material for the course is available from the course web-page

`http://www.math.chalmers.se/Stat/Grundutb/GU/MSG800/A19/Exercises/Exercises.html`

The problems in the book by Grimmett and Stirzaker are discussed by Patrik during lecture time as are the computer problems for own work. The problems for own work in Hsu's book are discussed during the exercise sessions.

There are two weekly exercise session during course weeks 2-7 that will be run i parallell, which is to say that both of them have the same programme each week – students may thus want to go to just one of them each week. During these sessions students also can get help with other problems.

Exercise Session	**Day**	**Time and place**
Exercise Session 1	Thusday 14 November	1.15-3 pm in room Euler
	Friday 15 November	3.15-5 pm in room Euler
Exercise Session 2	Thursday 21 November	1.15-3 pm in room Euler
	Friday 22 November	3.15-5 pm in room Euler
Exercise Session 3	Thursday 28 November	1.15-3 pm in room Euler
	Friday 29 November	3.15-5 pm in room Euler
Exercise Session 4	Thursday 5 November	1.15-3 pm in room Euler
	Friday 6 December	3.15-5 pm in room Euler
Exercise Session 5	Thursday 12 December	1.15-3 pm in room Euler
	Friday 13 December	3.15-5 pm in room Euler
Exercise Session 6	Thursday 19 December	1.15-3 pm in room Euler
	Friday 20 December	3.15-5 pm in room Euler

At Exercise Sessions 1-5 the problems for own work in Hsu's book are discussed and solved. During Exercise Session 6 a set of archetypical type-problems of typical type-exam-type are solved. The students are supposed to study solved problems first. Thereafter, ideally, students shall try to work with the problems for own work themselves before going to the exercise sessions and seeing the solutions.

Extra exercise sessions. In addition to the lectures and exercise sessions mentioned above there will be arranged two extra exercise sessions to help students before the exam Thursday 9 January 2020 1.15-3 PM and Friday 10 January 2020 3.15-5 PM in room Euler.

Examination. Written exam 4 hours pm Monday 13 January 2020 with reexams April 2020 and August 2020. Permitted aids on the written exam are either two A4-sheets (4 pages) of hand-written notes (xerox-copies and computer print-outs are not allowed) or Beta – but not both these aids. The written exams have 6 tasks with a total 30 possible points - you need 12 points for grade G (GU) and grade 3 (CTH), 18 points for grade 4 (CTH), 21 points for grade VG (GU) and 24 points for grade 5 (CTH), respectively.

After an exam has been graded you recive an official result mail from Ladok with your result. After that you can goto the expedition (see above) and look at your exam and the grading. If you want you can make complaints about the grading on a form that is available at the expedition.