

Brownian Motion, 7.5 hp

Course period:

January 18, 2021- March 31, 2021

Last day for application:

January 18, 2021

Course leader / Address for applications:

Jeff Steif / steif@chalmers.se

Course description (Advertisement for Ph.D. students):

The aim of this course is to study Brownian Motion (BM), which is usually considered the most important stochastic process in probability theory.

Some of the topics which will be covered are (1) sample path properties of BM such as its nowhere differentiability, (2) Law of the Iterated Logarithm, (3) some exact passage time distributions, (4) solution of the Dirichlet problem in terms of BM and (5) intersection properties of BM (where the critical dimension is 4).

The course will run in the third reading period, spring 2021. The course will run twice a week (2 hours each time). The schedule will be decided with the participants input.

Responsible department and other participation departments/organisations:

Mathematics Department

Teacher:

Jeff Steif

Examiner:

Jeff Steif

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1. Confirmation

Disciplinary domain: Science

Department in charge: Department of Mathematical Sciences

Main field of study: Mathematics

2. Position in the educational system

Ph.D. course.

3. Entry requirements

The student should have background in probability theory and integration theory. One can ask me if unsure.

4. Course content

The aim of this course is to give an overview of Brownian motion. Some of the topics which will be covered are (1) sample path properties of BM such as its nowhere differentiability, (2) Law of the Iterated Logarithm, (3) some exact passage time distributions, (4) solution of the Dirichlet problem in terms of BM and (5) intersection properties of BM (where the critical dimension is 4).

5. Outcomes

At the end of the course, the students will have acquired knowledge concerning many of the basic (and interesting) properties of Brownian Motion.

6. Literature

The primary book for the course is “Brownian Motion” by Peter Mörters and Yuval Peres.

7. Assessment

The present plan is that there will be some homework assignments and an oral exam at the end of the course. This plan might be modified.

A Ph.D. student who has failed a test twice has the right to change examiners, if it is possible. A written application should be sent to the Department.

In cases where a course has been discontinued or major changes have been made a Ph.D. should be guaranteed at least three examination occasions (including the ordinary examination occasion) during a time of at least one year from the last time the course was given.

8. Grading scale

The grading scale comprises Fail, (U), Pass (G).

9. Course Evaluation

The course evaluation is carried out together with the Ph.D. students at the end of the course,

and is followed by an individual, anonymous survey. The results and possible changes in the course will be shared with the students who participated in the evaluation and to those who are beginning the course.

10. Language of instruction

The language of instruction is English.