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| <b>Georg-August-Universität Göttingen</b><br><b>Module B.Mat.3341: Advances in applied and mathematical stochastics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 9 C<br>6 WLH                                                                                                             |
| <p><b>Learning outcome, core skills:</b><br/> <b>Learning outcome:</b></p> <p>The successful completion of modules of the cycle "Applied and mathematical stochastics" enables students to understand and apply a broad range of problems, theories, modelling and proof techniques of stochastics. During the course of the cycle students will be successively introduced to current research topics and able to carry out independent contributions to research (e. g. within the scope of a Master's thesis). Depending on the current course offer the following content-related competencies may be pursued: Students</p> <ul style="list-style-type: none"> <li>• are familiar with advanced concepts of probability theory established on measure theory and apply them independently;</li> <li>• are familiar with substantial concepts and approaches of probability modelling and inferential statistics;</li> <li>• know basic characteristics of stochastic processes as well as conditions for their existence and uniqueness;</li> <li>• have a pool of different stochastic processes in time and space at their disposal and characterise those, differentiate them and quote examples;</li> <li>• understand and identify basic characteristics of invariance of stochastic processes like stationary processes and isotropy;</li> <li>• analyse the convergence characteristic of stochastic processes;</li> <li>• analyse regularity characteristics of the paths of stochastic processes;</li> <li>• adequately model temporal and spatial phenomena in natural and economic sciences as stochastic processes, if necessary with unknown parameters;</li> <li>• analyse probabilistic and statistic models regarding their typical characteristics, estimate unknown parameters and make predictions for their paths on areas not observed / at times not observed;</li> <li>• discuss and compare different modelling approaches and evaluate the reliability of parameter estimates and predictions sceptically.</li> </ul> <p><b>Core skills:</b></p> <p>After having successfully completed the module, students will be able to</p> <ul style="list-style-type: none"> <li>• handle methods and concepts of the area "Applied and mathematical stochastics" confidently;</li> <li>• explain complex issues of the area "Applied and mathematical stochastics";</li> <li>• apply methods of the area "Applied and mathematical stochastics" to new problems in this area.</li> </ul> | <p><b>Workload:</b></p> <p>Attendance time:<br/>           84 h<br/>           Self-study time:<br/>           186 h</p> |
| <b>Course:</b> B.Mat.3341.Lec <b>Lecture course</b> (Lecture)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4 WLH                                                                                                                    |
| <b>Examination: Oral examination (approx. 20 minutes)</b><br>B.Mat.3341.Mp: Advances in applied and mathematical stochastics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 9 C                                                                                                                      |

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| <b>Examination prerequisites:</b><br>B.Mat.3341.Ue: Achievement of at least 50% of the exercise points and presentation, twice, of solutions in the exercise sessions         |                                                                      |
| <b>Course:</b> B.Mat.3341.Ex <b>Exercise session</b> (Exercise)                                                                                                               | 2 WLH                                                                |
| <b>Examination requirements:</b><br>Proof of advancement of knowledge and competencies acquired in the introductory module of the area "Applied and mathematical stochastics" |                                                                      |
| <b>Admission requirements:</b><br>none                                                                                                                                        | <b>Recommended previous knowledge:</b><br>B.Mat.3141                 |
| <b>Language:</b><br>English                                                                                                                                                   | <b>Person responsible for module:</b><br>Dean of studies mathematics |
| <b>Course frequency:</b><br>Usually subsequent to the module B.Mat.3141<br>"Introduction to applied and mathematical stochastics"                                             | <b>Duration:</b><br>1 semester[s]                                    |
| <b>Number of repeat examinations permitted:</b><br>three times                                                                                                                | <b>Recommended semester:</b><br>Bachelor: 6; Master: 1 - 4           |
| <b>Maximum number of students:</b><br>not limited                                                                                                                             |                                                                      |
| <b>Additional notes and regulations:</b><br><b>Instructor:</b> Lecturers at the Institute of Mathematical Stochastics                                                         |                                                                      |