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| Program of Studies: | Master Program Bioinformatics |
| Name of the module: | Special Lecture Bioinformatics: Modelling and Simulation Sequencing |
| Abbreviation: | BI-BM-1 |
| Modules: | Lecture and Tutorial |
| Semester: | Winter semester |
| Responsible lecturer: | Prof. Dr. Verena Wolf |
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| Language: | English |
| Level of the unit/ Mandatory or not : | Graduate course / mandatory elective |
| Course type/weekly hours: | Lecture: 4 h Tutorial: 2 h |
| Total workload: | 270 h = 90 h of classes and 180 h private study |
| Credits: | 9 |
| Entrance requirements: | The course is open to students from computer science or bioinformatics interested in modelling and simulation. Mathematical skills and basic programming skills in Matlab are of advantage but not mandatory. |
| Aims/Competences to be developed: | The course aims at giving the participants knowledge of the basic concepts in the area of modelling and simulation. The course will focus on modelling and simulation of real-world discrete event systems, that is, at discrete time instants events occur and change the state of the system. Examples of discrete events are customer arrivals at a queue of a service desk, biochemical reactions in a living cell, telephone calls in a call center, etc. Moreover, continuous models will be discussed and their usage in traffic modelling as well as for the description of biochemical reaction networks. |

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| Content: | <ul style="list-style-type: none"> - Introduction - Differential equations and numerical simulation - Modelling languages: Petri Nets, Reaction rules, Guarded Commands - Introduction to Probabilities - Markov Chains in discrete and continuous time, and their simulation - Non-Markov models and Discrete Event Simulation - Statistical analysis of output - (Mean field models of dynamical networks) - (Advanced simulation techniques) • |
| Assessment/Exams: | <p>There will be two written exams (mid-term before Christmas). Their grades contribute equally to the final grade ("Schein"). Handing in or presentation of assignments will give a bonus for the final grade. An oral re-exam is possible which covers those parts of the lecture where a retake is desired.</p> |
| Literature: | <ul style="list-style-type: none"> - Stochastic Petri nets: Modelling, Stability, Simulation. Peter Jay Haas, 2002. - Introduction to Discrete Event Systems. C. Cassandras and S. Lafortune, 2008. - Simulation Modelling and Analysis. Averill M. Law. Mcgraw-Hill, 2006. [in the library: OG floor, code is LAW a3 2007:1 1.Ex] - Discrete-Event Simulation. J. Banks, J. Carson, B. Nelson, D. Nicol. Prentice Hall, 2000. - Simulation. Sheldon M. Ross. Elsevier, 2006. - Performance of Computer Communication Systems: A Model-Based Approach: A Model Based Approach to Performance Evaluation. Boudewijn R. Haverkort. Wiley, 1998. - INTRODUCTION TO PROBABILITY. C. Grinstead and L. Snell |