

# Applied Discrete Modelling

(in German: Applied Discrete Modelling )

**Module-ID: FIN-INF-120279**

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| <b>Link:</b>                        | <a href="#">LSF</a>                                                                                                                                                                                                                                                                             |
| <b>Responsibility:</b>              | PD Dr. Claudia Krull                                                                                                                                                                                                                                                                            |
| <b>Lecturer:</b>                    | PD Dr. Claudia Krull                                                                                                                                                                                                                                                                            |
| <b>Classes:</b>                     | <ul style="list-style-type: none"><li>• Lecture <i>Applied Discrete Modelling</i></li><li>• Exercise class <i>Applied Discrete Modelling</i></li></ul>                                                                                                                                          |
| <b>Applicability in curriculum:</b> | <ul style="list-style-type: none"><li>- M.Sc. INF: Informatik</li><li>- M.Sc. INGINF: Informatik</li><li>- M.Sc. WIF: Informatik</li><li>- M.Sc. DKE: Learning Methods and Models for Data Science</li><li>- M.Sc. DE: Fachliche Spezialisierung</li><li>- M.Sc. VC: Computer Science</li></ul> |

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| <b>Abbreviation</b><br>ADM | <b>Credit Points</b><br>6 | <b>Semester</b><br>Winter | <b>Term</b><br>ab 1. | <b>Duration</b><br>1 Semester | <b>Language</b><br>english | <b>Level</b><br>Master |
|----------------------------|---------------------------|---------------------------|----------------------|-------------------------------|----------------------------|------------------------|

## Intended learning outcomes:

- Students understand the basics of Markov chains and know selected applications and solution methods
- Students understand non-Markovian stochastic processes and can model and simulate them in different ways
- Students understand hidden Markovian and non-Markovian processes
- Students know selected research topics of the research group
- Students can implement the models and methods they have learned and apply them to problems from the university's main research areas, in particular medicine and engineering

**Content:**

- Discrete-time and continuous-time Markov chains
- Applications and implementation of solution methods for Markov chains
- Method of supplementary variables
- Proxel simulation and phase distributions
- Modeling with hidden models
- Programming solution methods for different model classes
- Modeling and solving problems from medicine and engineering

**Workload:**

56 h lectures and exercise classes

124 h independent work

| Pre-examination requirements:                                                   | Type of examination: | Teaching method / lecture hours per week (SWS):                                                |
|---------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------|
| Solutions to Assignments 1-6 need to be handed in before the exam registration. | Oral Exam 30 Minutes | <ul style="list-style-type: none"><li>• Lecture 2 SWS</li><li>• Exercise class 2 SWS</li></ul> |

| Prerequisites according to examination regulations: | Recommended prerequisites:                                                                               |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| none                                                | <ul style="list-style-type: none"><li>• Engineering mathematics</li><li>• Computer programming</li></ul> |

| Media:                                        | Literature: |
|-----------------------------------------------|-------------|
| recorded lectures and exercises are available |             |

**Comments:**

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