

<b>Module Name</b> Simulation and Modeling 1						
<b>Type of Module</b> Basic Module				<b>Module Code</b> BM-SimMod1		
<b>Identification Number</b> MN-CS-SimMod1	<b>Workload</b> 270 h	<b>Credit Points</b> 9 CP	<b>Term</b> WiSe	<b>Offered Every</b> Winter semester	<b>Start</b> Winter term only	<b>Duration</b> 1 semester
<b>1</b>	<b>Course Types</b> a) Lectures b) Exercises c) Project Classes		<b>Contact Time</b> 45 h 30 h 15 h	<b>Private Study</b> 90 h 60 h 30 h		<b>Planned Group Size</b> 20-30 students
<b>2</b>	<b>Module Objectives and Skills to be Acquired</b> <ul style="list-style-type: none"> <li>• overview on mathematical modeling and dynamical systems</li> <li>• overview of numerical procedures for linear equation systems</li> <li>• overview on numerical procedures for data analysis</li> <li>• critical judgement of model simulations and capacity of model development</li> <li>• skillfull application of numerical procedures for linear equations and further data analysis</li> <li>• solving challenging projects in a team</li> </ul>					
<b>3</b>	<b>Module Content</b> <ul style="list-style-type: none"> <li>• Introduction to (mathematical) modeling: steps, formulation and potential error sources</li> <li>• Introduction to dynamical system theory: dynamical systems, properties, capabilities and limitations</li> <li>• Numerical procedures to solve systems of linear equations: different methods, advantages and disadvantages</li> <li>• Introduction to data analysis and processing: machine learning, clustering, statistics</li> </ul>					
<b>4</b>	<b>Teaching Methods</b> Lectures are providing the overview and introduction to topics. Exercises are providing the practical knowledge and help to deepen the understanding. The project work will be done in teams and consist of different challenges, which need the lecture content for solution. Examples will be taken from the various areas of specialization.					
<b>5</b>	<b>Prerequisites (for the Module)</b> Formally: none					
<b>6</b>	<b>Type of Examination</b> written Examination (graded)					
<b>7</b>	<b>Credits Awarded</b> The module is passed by successful participation in the exercises (50 % of the possible points have to be obtained), presentation of the project work and passing the examination at the end of the module.					
<b>8</b>	<b>Compatibility with other Curricula</b> Suitable as an elective course for Master of Science students from other areas.					

<b>9</b>	<b>Proportion of Final Grade</b> 9/114
<b>10</b>	<b>Module Coordinator</b> V. Schemann
<b>11</b>	<b>Further Information</b>