**Module Description**

**Spatio-temporal Data Modelling**

**General Information**

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<tr>
<th>Module Code</th>
<th>Spatio-temporal Data Modelling (GEO_StDatMod)</th>
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<tbody>
<tr>
<td>Module Category</td>
<td>Specialization</td>
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<tr>
<td>Lessons</td>
<td>3 lecture periods per week</td>
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<tr>
<td>Number of ECTS Credits</td>
<td>3</td>
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<tr>
<td>Module Language</td>
<td>Taught in German or English</td>
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<td>Materials in German or English</td>
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<td>Projects can be completed in German or English</td>
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**Module Description**

Traditional modelling of geodata and implementation thereof in geographic information systems focuses on most appropriate and efficient representation of single states of spatial phenomena. In this sense, today's geoinformation systems can be regarded as a digital development of the traditional map paradigm. With regard to current and future requirements for geoinformation solutions, this traditional paradigm has a number of weaknesses:

- The semantics of maps and the many heterogeneous geodata usually require human interpretation and can only be read with difficulty by machines and at best can only be interpreted incompletely.
- Phenomena and processes that change over time cannot be modelled and analysed, or only in a very complicated way.
- Dynamic phenomena and moving objects are difficult or impossible to model and analyse.

This module focuses extends traditional geodata modelling approaches by the dimensions semantics, time and dynamics and their application to real applications and tasks in the geoinformation domain. For each of these new dimensions or concepts, this module deals with the corresponding theories, methods and tools, most of which originate from the area of database and web technologies.

**Learning Objectives, Contents, Methods**

**Learning Objectives and Acquired Competences**

**Professional Goals:**

- Students explain the most important concepts and methods applied to extended spatio-temporal data modelling.
- They assess the possible applications of concepts and methods for extended semantic-spatio-temporal data modelling and show suitable approaches for specific problems.
- They read, interpret and explain simple data or data model descriptions that have been created using the description languages covered.
- They assess the requirements and suitability of modelling tools.
- Students create simple semantic, spatio-temporal data schemata using selected modelling tools.

**Methodical Goals:**

- Independent research, development, presentation and discussion of selected contents in addition to the lecture contents.

**Contents of the Module**

- Introduction
- Part 1: Semantics
  - Semantic Web
  - Geospatial Semantic Web
  - Ontologies
  - Ontology description languages RDF and OWL
  - SPARQL – Query language for RDF
• Part 2: Time
  • Time in GIS
  • Spatio-Temporal Representations
  • Temporal DBMS
• Part 3: Dynamics
  • Moving Objects in GIS
  • Concepts and data structures
  • Architectures
• Selected topics / Outlook

Teaching and Learning Methods
• Lectures (approx. 2 lessons per week)
• Exercises (approx. 1 lesson per week)
• Self-study and short presentation of selected supplementary contents

Requirements
None

Assessment
Assessment and Testat Requirements

Final module exam
Duration 90 min
Permitted tools Written summaries (max. 7 pages A4, single-sided, handwritten)

Version 14.7.2020