Computing Module
Academic Year 2019/20
Summer Semester

Language of Instruction: English

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Computing Module

Summer Semester 2020

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject</th>
<th>Sem.</th>
<th>ECTS Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCS</td>
<td>Computer Science – Data Science (ILV)</td>
<td>2</td>
<td>5</td>
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<tr>
<td>MCS</td>
<td>Legal Aspects of Research (ILV)</td>
<td>2</td>
<td>2</td>
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<tr>
<td>MCS</td>
<td>Mentoring II (ILV)</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>MCS</td>
<td>Research Ethics (ILV)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>MCS</td>
<td>Research Project II (PT)</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>MCS</td>
<td>Sources of Innovation (ILV)</td>
<td>2</td>
<td>2</td>
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<tr>
<td>MCS</td>
<td>Systematic Innovation (ILV)</td>
<td>2</td>
<td>3</td>
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<tr>
<td>MCS</td>
<td>Writing in technical disciplines and research (ILV)</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>MIS</td>
<td>Industrial Security and Safety</td>
<td>4</td>
<td>5</td>
</tr>
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<td>-</td>
<td>German Language and Austrian Culture</td>
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<td>6</td>
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<td><strong>TOTAL</strong></td>
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PLEASE NOTE: All courses are subject to changes until the beginning of the semester!
Detailed course description:

**Computer Science – Data Science (5 ECTS credits)**

**Content:**
The offered course with a scope of 5 ECTS covers important in-depth content of data analysis for the chosen field of study in coordination with the supervisor.

Important topics include (but are not limited to):

**Preparation & Preprocessing:**
- Sample design, planning of statistical data collection, data selection
- Data types, measurement scales, dissimilarity measures, similarity measures, sequence relations, text relations
- Understanding of data and data quality (+metadata), metadata management, knowledge modelling, knowledge representation
- Feature generation
- Error types, normalisation, filtering, transformation, consolidation

**Analysis methods:**
- Correlation, regression vs. classification: generative models, discriminative models, probabilistic and non-probabilistic models, non-parametric models, clustering, text mining, sentiment analysis, anomaly detection
- Follow-up:
  - Evaluation, documentation, critical reflection of results

**Legal Aspects of Research (2 ECTS credits)**

**Content:**
Intellectual Property & Competition Law
- Exploitation of rights in the national and international environment
- Trade with rights, patents and licenses with special regard to Digital Rights Management and Dual Licensing, Open Source, Open Data, Open Innovation

Data Protection
- Data protection, privacy and freedom of information,
- EU General Data Protection Regulation and other relevant laws
- Rights and obligations of businesses & consumers

General Data Protection Regulation and other relevant laws

**Mentoring II (2 ECTS credits)**

**Content:**
The content of the course is coordinated individually in the context of the mentoring sessions.
Research Ethics (1 ECTS credits)

Content:
• Introduction to ethics, basic concepts of ethics (legitimacy, morality, justice, trust, human dignity, values)
• Ethical thinking and its importance for IT, special problems of modern information ethics, hacker ethics, ...
• Distinction between ethics of principles vs. utilitarian approaches, examples of problems in the field of artificial intelligence, ...
• Ethics and research, examples from science
• Human rights as an anchor of ethics, intersection of ethics and law

Research Project II (10 ECTS credits)

Content:
The content of the project is coordinated individually with the responsible supervisors.

Sources of Innovation (2 ECTS credits)

Content:
This course provides an introduction to the sources of innovation. Students will get an overview of the different internal and external knowledge sources for innovation and of how to use selected sources effectively. In this context, open and closed innovation approaches will be discussed. A special focus is on the interaction of innovation, exploration, use and search as well as the growing importance of efficient search approaches across distributed innovation sources. Another important aspect is the role of users and user communities as sources of innovation. Finally, concrete applications for the generation of inputs for innovation processes of companies, such as the lead user method or crowdsourcing, are examined in more detail.

Systematic Innovation (3 ECTS credits)

Content:
Introduction to the theory of inventive problem solving (TRIZ)
• History, Objectives, Terms
• Basic principles, theses of G.S. Altschuller
• Method overview
Selected TRIZ methods for the different phases of an inventive problem solution:
• Define and analyze the development problem:
• (S-curve analysis, 9-field thinking, function and object modeling, ideality)
• Generate solutions for contradictions
• Evaluate ideas, work them out and prioritise solutions
Writing in technical disciplines and research (5 ECTS credits)

Content:
The adequate use of language plays an increasingly important role, especially in the technical field. Students have to practice how to express themselves comprehensibly in writing. Furthermore, self-reflection and editorial work in small groups are also trained in this course. Students will write their own texts with the main focus on comprehensibility beyond the realm of technical language. Spelling and grammar as well as formal design and stylistics will also be taken into account.

- Text comprehension (technical texts)
- Explanation and description of technical processes
- Short presentations
- Case studies
- Expansion of vocabulary, especially in the field of technology
- Improvement of writing and speaking skills through working on selected technical texts and through suitable simulations of specific situations

Industrial Security and Safety (5 ECTS credits)

Content:
- Definition Industrial Control System (ICS) Security
- Security goals Industrial Security
- Understanding of SCADA-/DCS architectures
- ICS security risks and threats
- Security requirements of the industrial security sector
- Difference Industrial Security vs. IT Security
- Overview ICS network protocols
- Known ICS threats and analysis
- Critical Infrastructure Protection Standards

Key aspects of the design, implementation and analysis of safety-critical computer systems are addressed. This includes special development methods such as Model Checking. The course also addresses areas of application of safety-critical systems, analysis of requirements and identification of potential hazards (hazard analysis), analysis of system design (fault tolerance design) and methods for the proof of safety (reliability modeling).
German Language and Austrian Culture (6 ECTS credits)

Content:
Students train their speaking, writing, reading and listening skills in the German language. Furthermore, they learn about Austrian culture, e.g. history and geography, the political system, festivals, customs and traditions, food.
The course is offered at two different levels, Beginners and Advanced. The students' level of German is ascertained in the first session.