MASTER’S DEGREE PROGRAM
COMPUTER SCIENCE
STRUCTURE OF MASTER’S DEGREE PROGRAM

Mandatory:

- Two 30 ECTS specializations

Elective:

- Recommendation is a 3rd specialization.
- A small number of elective courses in computer science is offered in addition to specializations. Project work (partly) is also a possibility.
- Elective courses may be supportive rather than core computer science, e.g. extra mathematics courses.
- There may be requirements for the composition of the study program in connection with possible admission. In this case mandatory courses replace the elective courses (partly).

Thesis: Written within the area of specialization 1 or 2
CURRENT SPECIALIZATIONS

Specializations are taught by active researchers in the corresponding field

Current offerings

- Algorithmics (30 ECTS)
- Cryptology (30 ECTS)
- Data-Intensive Systems (30 ECTS)
- Human-computer Interaction (30 ECTS)
- Programming Languages (30 ECTS)
- Ubiquitous Computing and Interaction (30 ECTS)
- Bioinformatics (30 ECTS)
  - For more than a single specialization in bioinformatics apply for the special Master’s Degree Program in Bioinformatics

We expect to offer more specializations from Autumn 2021.
Details will be available around April 2021.
ALGORITHMICS

<table>
<thead>
<tr>
<th>Semester (Fall)</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Computational Geometry: Theory and Experimentation (10 ECTS)</td>
<td>PA</td>
<td></td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Randomized Algorithms (10 ECTS)</td>
<td>KGL, IC</td>
<td></td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Theory of Algorithms and Computational Complexity (10 ECTS)</td>
<td>KAH</td>
<td></td>
</tr>
</tbody>
</table>

- Semesters are independent – can be taken in any order
- Third semester may be replaced with Advanced Data Management and Analysis (10 ECTS) from the Data-Intensive Systems group

**Algorithms and Data Structures**
- Chris Schwiegelshohn
- Gerth Stølting Brodal
- Kasper Green Larsen
- Lars Arge
- Peyman Afshani

**Mathematical Computer Science**
- Ioannis Caragiannis
- Kristoffer Arnsfelt Hansen
- Srikanth Srinivasan
CRYPTOLOGY

| 1st Sem (Fall) | Cryptology (10 ECTS) | IBD |
| 2nd Sem (Spring) | Cryptologic Protocol Theory (10 ECTS) | IBD + JBN |
| 3rd Sem (Fall) | Cryptographic Computing (10 ECTS) | CO + PS |

- First semester is prerequisite for the other semesters
- Last two semesters can be taken in any order

Cryptography and Security
- Claudio Orlandi
- Diego F. Aranha
- Ivan Bjerre Damgård
- Jesper Buus Nielsen
- Peter Scholl
# Data-intensive Systems

<table>
<thead>
<tr>
<th>Semester (Fall)</th>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem</td>
<td>Advanced Data Management and Analysis (10 ECTS)</td>
<td>IA+PK+CA</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Data Mining (10 ECTS)</td>
<td>DM</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Data Visualization (10 ECTS) OR Deep Learning for Visual Recognition (10 ECTS)</td>
<td></td>
</tr>
</tbody>
</table>

- Semesters are independent – can be taken in any order
- (*) Machine Learning is a prerequisite for Data Mining
- Data Visualization and Deep Learning for Visual Recognition are taught by and shared with the Ubiquitous Computing and Interaction group

## Data-intensive Systems

- Cigdem Aslay
- Davide Mottin
- Ira Assent
- Panagiotis Karras
HUMAN-COMPUTER INTERACTION

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Interactivity and Computer Mediation - Concepts, Theories, Methods, Cases (10 ECTS)</td>
<td>OB</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Designing Interactive Technologies (10 ECTS)</td>
<td>SB</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Multimodal Interaction (10 ECTS)</td>
<td>EH</td>
</tr>
</tbody>
</table>

- Semesters are independent – can be taken in any order

Computer Mediated Activity
- Eve Hoggan
- Olav Bertelsen
- Susanne Bødker
PROGRAMMING LANGUAGES

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Program Analysis and Verification (10 ECTS)</td>
<td>AM + LB</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Language-based Security (10 ECTS)</td>
<td>AA</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Functional Programming (10 ECTS)</td>
<td>BS</td>
</tr>
</tbody>
</table>

- Semesters are independent – can be taken in any order

Logic and Semantics
- Amin Timany
- Aslan Askarov
- Bas Spitters
- Jaco van de Pol
- Lars Birkedal

Programming Languages
- Anders Møller
- Andreas Pavlogiannis
- Magnus Madsen
UBIQUITOUS COMPUTING AND INTERACTION

<table>
<thead>
<tr>
<th>1st sem (Fall)</th>
<th>Building the Internet of Things with P2P and Cloud Computing (10 ECTS)</th>
<th>NOB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Sem (Spring)</td>
<td>Augmented Reality (5 ECTS)</td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>Advanced Augmented Reality Project (5 ECTS)</td>
<td>KG</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Data Visualization (10 ECTS) OR</td>
<td>H-JS</td>
</tr>
<tr>
<td></td>
<td>Deep Learning for Visual Recognition (10 ECTS)</td>
<td></td>
</tr>
</tbody>
</table>

• Semesters are independent – can be taken in any order

Ubiqitous Computing and Interaction
• Hans Gellersen
• Hans-Jörg Schultz
• Kaj Grønbæk
• Marianne Graves Petersen
• Niels Olof Bouvin
SPECIALIZATIONS FROM MASTER’S DEGREE PROGRAM IN **BIOINFORMATICS**  
(OFFERED BY BIOINFORMATICS RESEARCH CENTRE)

### Algorithms and Programming

<table>
<thead>
<tr>
<th>Semester</th>
<th>Recommended order of courses</th>
<th>Alternative order of courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Genome-Scale Algorithms (10 ECTS)</td>
<td>Tree of Life (10 ECTS)</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Algorithms in Bioinformatics (10 ECTS)</td>
<td>Algorithms in Bioinformatics (10 ECTS)</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Tree of Life (10 ECTS) OR Projects in Bioinformatics (10 ECTS)</td>
<td>Genome-Scale Algorithms (10 ECTS)</td>
</tr>
</tbody>
</table>

### Statistics and Data

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Data Science in Bioinformatics (10 ECTS)</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Statistical and Machine Learning in Bioinformatics (10 ECTS)</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Tree of Life (10 ECTS) OR Genome-Scale Algorithms (10 ECTS) OR Projects in Bioinformatics (10 ECTS)</td>
</tr>
</tbody>
</table>

For more info about the Master’s program in bioinformatics, see [http://www.birc.au.dk/Studies](http://www.birc.au.dk/Studies)  
Contact: Christian Storm Pedersen cstorm@birc.au.dk
ELECTIVE COURSES (CS)

Elective courses (apart from specialisations):

Fall
• Interdisciplinary Digital Entrepreneurship (10 ECTS)
• Machine Learning (10 ECTS) (bachelor course)

Fall & Spring:
• Project work in Computer Science (5 or 10 ECTS)
• Vocational Training Project at Department of Computer Science (10 ECTS)
GUIDANCE/QUESTIONS

Guidance for your personal study program?
Questions about rules for composition of the study program?

Please contact

• Gudmund Skovbjerg Frandsen
• gudmund@cs.au.dk