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

<table>
<thead>
<tr>
<th>1st Semester</th>
<th>2nd Semester</th>
<th>3rd Semester</th>
<th>4th Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specialization 1 (30 ECTS)</td>
<td>Specialization 2 (30 ECTS)</td>
<td>Elective (30 ECTS)</td>
<td>Thesis (30 ECTS)</td>
</tr>
</tbody>
</table>

**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.
ALGORITHMS

<table>
<thead>
<tr>
<th>1st Sem (Fall)</th>
<th>Computational Geometry: Theory and Experimentation (10 ECTS)</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Sem (Spring)</td>
<td>Randomized Algorithms (10 ECTS)</td>
<td>KGL</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Theory of Algorithms and Computational Complexity (10 ECTS)</td>
<td>KAH</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
## CRYPTOLOGY

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Cryptology (10 ECTS)</td>
<td>IBD</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Cryptologic Protocol Theory (10 ECTS)</td>
<td>IBD + JBN</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Cryptographic Computing (10 ECTS)</td>
<td>CO + PS</td>
</tr>
</tbody>
</table>

- 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

1st Sem (Fall)  | Advanced Data Management and Analysis (10 ECTS) | IA+PK+CA
2nd Sem (Spring)  | Data Mining (10 ECTS) * | DM
3rd Sem (Fall)  | Data Visualization (10 ECTS) OR Deep Learning for Visual Recognition (10 ECTS) |

- 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 Description</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</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Sem (Fall)</td>
<td>Program Analysis and Verification (10 ECTS)</td>
<td>AM + LB</td>
<td>Amin Timany, Aslan Askarov, Bas Spitters, Jaco van de Pol, Lars Birkedal</td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Language-based Security (10 ECTS)</td>
<td>AA</td>
<td>Anders Møller, Andreas Pavlogiannis, Magnus Madsen</td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Functional Programming (10 ECTS)</td>
<td>BS</td>
<td></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></th>
<th>Course Description</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st sem (Fall)</td>
<td>Building the Internet of Things with P2P and Cloud Computing (10 ECTS)</td>
<td>NOB</td>
<td></td>
</tr>
<tr>
<td>2nd Sem (Spring)</td>
<td>Augmented Reality (5 ECTS)</td>
<td>KG</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Augmented Reality Project (5 ECTS)</td>
<td>KG</td>
<td></td>
</tr>
<tr>
<td>3rd Sem (Fall)</td>
<td>Data Visualization (10 ECTS) OR Deep Learning for Visual Recognition (10 ECTS)</td>
<td>H-JS</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>Course</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