# Data Science 2024-25

## Block "Projects & SHS"

<table>
<thead>
<tr>
<th>Courses</th>
<th>Language Code</th>
<th>Section</th>
<th>Teacher</th>
<th>Specialization</th>
<th>Master 1</th>
<th>Master 2</th>
<th>Exam</th>
<th>Exam Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p</td>
<td>l</td>
<td>e</td>
<td>p</td>
</tr>
<tr>
<td>Semester research project in Data Science</td>
<td>E</td>
<td>COM-412</td>
<td>SC</td>
<td>Profs divers</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
<td>Win</td>
</tr>
</tbody>
</table>

**HSS : Introduction to project**
- **SHS** | Win | 3

**HSS : Project**
- **SHS** | Sum | 3

## Group 1

<table>
<thead>
<tr>
<th>Courses</th>
<th>Language Code</th>
<th>Section</th>
<th>Teacher</th>
<th>Specialization</th>
<th>Master 1</th>
<th>Master 2</th>
<th>Exam</th>
<th>Exam Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p</td>
<td>l</td>
<td>e</td>
<td>p</td>
</tr>
<tr>
<td>Algorithms II</td>
<td>E</td>
<td>CS-450</td>
<td>IN</td>
<td>Kapralov Svensson</td>
<td>4h</td>
<td>3h</td>
<td>Win</td>
<td>Written</td>
</tr>
<tr>
<td>Applied data analysis</td>
<td>E</td>
<td>CS-401</td>
<td>SC</td>
<td>Brbic</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
<td>Written</td>
</tr>
<tr>
<td>Foundations of Data Science</td>
<td>E</td>
<td>COM-406</td>
<td>IN</td>
<td>Gastpar Urbanke</td>
<td>4h</td>
<td>2h</td>
<td>Win</td>
<td>Written</td>
</tr>
<tr>
<td>Information security and privacy</td>
<td>E</td>
<td>COM-402</td>
<td>IN</td>
<td>Payer</td>
<td>3h</td>
<td>1h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Machine learning</td>
<td>E</td>
<td>CS-433</td>
<td>IN</td>
<td>Flammarion Jaggi</td>
<td>4h</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
</tbody>
</table>

**Modern natural language processing**
- **E** | CS-552 | IN | Bosselut | 3h | 1h | 2h | Sum | During the semester | 8 |

**Optimization for machine learning**
- **E** | CS-439 | IN | Flammarion Jaggi | 2h | 2h | 1h | Sum | Written | 8 |

**Statistics for data science**
- **E** | MATH-413 | MA | Chandak Limnios | 4h | 2h | Sum | Written | 8 |

**Systems for data management and data science**
- **E** | CS-460 | IN | Alamaki Kermarrec | 2h | 2h | 2h | Sum | Written | 8 |

## Group 2 : Options

<table>
<thead>
<tr>
<th>Courses</th>
<th>Language Code</th>
<th>Section</th>
<th>Teacher</th>
<th>Specialization</th>
<th>Master 1</th>
<th>Master 2</th>
<th>Exam</th>
<th>Exam Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p</td>
<td>l</td>
<td>e</td>
<td>p</td>
</tr>
<tr>
<td>Advanced compiler construction</td>
<td>E</td>
<td>CS-420</td>
<td>IN</td>
<td>Schinz</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
<td>During the semester</td>
</tr>
<tr>
<td>Advanced cryptography</td>
<td>E</td>
<td>COM-501</td>
<td>SC</td>
<td>Vaudenay</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
<td>Written</td>
</tr>
<tr>
<td>Advanced probability and applications</td>
<td>E</td>
<td>COM-417</td>
<td>SC</td>
<td>Shkel</td>
<td>4h</td>
<td>2h</td>
<td>Win</td>
<td>Written</td>
</tr>
<tr>
<td>Advanced topics on privacy enhancing technologies</td>
<td>E</td>
<td>CS-523</td>
<td>IN</td>
<td>Troncoso</td>
<td>3h</td>
<td>1h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>AI product management</td>
<td>E</td>
<td>CS-500</td>
<td>IN</td>
<td>Kaboli Zamir</td>
<td>2h</td>
<td>2h</td>
<td>3h</td>
<td>Win</td>
</tr>
<tr>
<td>Applied biostatistics</td>
<td>E</td>
<td>MATH-493</td>
<td>MA</td>
<td>Goldstein</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
<td>During the semester</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
<th>Time</th>
<th>Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automatic speech processing</td>
<td>EE-554</td>
<td>EL</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Basics of mobile robotics</td>
<td>MICRO-452</td>
<td>MT</td>
<td>1h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Causal inference</td>
<td>MGT-416</td>
<td>MTE</td>
<td>2h</td>
<td>1h</td>
<td>Sum</td>
</tr>
<tr>
<td>Causal thinking</td>
<td>MATH-352</td>
<td>MA</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Computational complexity</td>
<td>CS-524</td>
<td>IN</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Computational linear algebra</td>
<td>MATH-453</td>
<td>MA</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Computational neuroscience: neuronal dynamics</td>
<td>NX-465</td>
<td>NX</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Computational photography</td>
<td>CS-413</td>
<td>SC</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Computers and music</td>
<td>COM-418</td>
<td>SC</td>
<td>2h</td>
<td>1h</td>
<td>Sum</td>
</tr>
<tr>
<td>Computer vision</td>
<td>CS-442</td>
<td>IN</td>
<td>2h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Concurrent computing</td>
<td>CS-453</td>
<td>SC</td>
<td>2h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Cryptography and security</td>
<td>COM-401</td>
<td>SC</td>
<td>4h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Data visualization</td>
<td>COM-480</td>
<td>SC</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Deep learning</td>
<td>EE-559</td>
<td>EL</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Deep learning in biomedicine</td>
<td>CS-502</td>
<td>IN</td>
<td>2h</td>
<td>1h</td>
<td>Sum</td>
</tr>
<tr>
<td>Deep reinforcement learning</td>
<td>CS-456</td>
<td>IN</td>
<td>2h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Digital education</td>
<td>CS-411</td>
<td>IN</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Distributed algorithms</td>
<td>CS-451</td>
<td>SC</td>
<td>2h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Distributed information systems</td>
<td>CS-423</td>
<td>SC</td>
<td>2h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Distributed intelligent systems</td>
<td>ENG-466</td>
<td>SIE</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Ethics and law of AI</td>
<td>DH-415</td>
<td>DH</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Formal verification</td>
<td>CS-550</td>
<td>IN</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Geometric computing</td>
<td>CS-457</td>
<td>IN</td>
<td>3h</td>
<td>1h</td>
<td>Win</td>
</tr>
<tr>
<td>Graph theory</td>
<td>MATH-360</td>
<td>MA</td>
<td>2h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Image analysis and pattern recognition</td>
<td>EE-451</td>
<td>EL</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
<tr>
<td>Information theory and coding</td>
<td>COM-404</td>
<td>SC</td>
<td>4h</td>
<td>2h</td>
<td>Win</td>
</tr>
<tr>
<td>Intelligent agents</td>
<td>CS-430</td>
<td>IN</td>
<td>3h</td>
<td>3h</td>
<td>Win</td>
</tr>
<tr>
<td>Interaction design</td>
<td>CS-486</td>
<td>IN</td>
<td>2h</td>
<td>1h</td>
<td>Sum</td>
</tr>
<tr>
<td>Interactive theorem proving</td>
<td>CS-428</td>
<td>IN</td>
<td>2h</td>
<td>2h</td>
<td>Sum</td>
</tr>
</tbody>
</table>
**Introduction to natural language processing**

- **Course Code:** CS-431
- **Instructor:** Bosselut, Chappelier, Rajman
- **Hours:** 2h 2h
- **Season:** Win
- **Type:** Written
- **Credit:** 6

**Large-scale data science for real-world data**

- **Course Code:** COM-490
- **Instructor:** Bouillet, Delgado, Sami, Verscheure
- **Hours:** 4h
- **Season:** Sum
- **Type:** During the semester
- **Credit:** 6

**Learning in neural networks**

- **Course Code:** CS-479
- **Instructor:** Gerstner
- **Hours:** 2h 1h 1h
- **Season:** Sum
- **Type:** Oral
- **Credit:** 6

**Learning theory**

- **Course Code:** CS-526
- **Instructor:** Macris
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** Written
- **Credit:** 6

**Linear models**

- **Course Code:** MATH-341
- **Instructor:** Panaretos
- **Hours:** 2h 2h
- **Season:** Win
- **Type:** Written
- **Credit:** 5

**Machine learning for behavioral data**

- **Course Code:** CS-421
- **Instructor:** Käser
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** Written
- **Credit:** 6

**Markov chains and algorithmic applications**

- **Course Code:** COM-516
- **Instructor:**
- **Hours:** 2h 1h 1h
- **Season:** Win
- **Type:** Written
- **Credit:** 6

**Mathematics of data: from theory to computation**

- **Course Code:** EE-556
- **Instructor:** Cevher
- **Hours:** 3h 3h
- **Season:** Win
- **Type:** Written
- **Credit:** 6

**Network machine learning**

- **Course Code:** EE-452
- **Instructor:** Frossard, Thanou
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** During the semester
- **Credit:** 4

**Networks out of control**

- **Course Code:** COM-512
- **Instructor:**
- **Hours:** 2h 1h
- **Season:** Sum
- **Type:** Written
- **Credit:** 6

**Optional research project in Data Science**

- **Course Code:** COM-508
- **Instructor:** Profs divers
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** During the semester
- **Credit:** 8

**Project management and risk analysis**

- **Course Code:** MGT-427
- **Instructor:** Wieser
- **Hours:** 2h 1h
- **Season:** During the semester
- **Type:** Win
- **Credit:** 4

**Software security**

- **Course Code:** CS-412
- **Instructor:** Payer
- **Hours:** 3h 2h 1h
- **Season:** During the semester
- **Type:** Sum
- **Credit:** 8

**Statistical mechanics and Gibbs measures**

- **Course Code:** MATH-486
- **Instructor:**
- **Hours:** 2h
- **Season:** Sum
- **Type:** Oral
- **Credit:** 5

**Statistical physics of computation**

- **Course Code:** PHYS-512
- **Instructor:** Erba
- **Hours:** 2h 2h
- **Season:** Win
- **Type:** Written
- **Credit:** 4

**Statistical theory**

- **Course Code:** MATH-442
- **Instructor:** Zemel
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** Written
- **Credit:** 5

**Student seminar: security protocols and applications**

- **Course Code:** COM-506
- **Instructor:** Vaudenay
- **Hours:** 2h
- **Season:** Sum
- **Type:** During the semester
- **Credit:** 3

**Sublinear algorithms for big data analysis**

- **Course Code:** CS-448
- **Instructor:** Kapralov
- **Hours:** 2h 1h
- **Season:** Sum
- **Type:** During the semester
- **Credit:** 6

**Time series**

- **Course Code:** MATH-342
- **Instructor:** Olhede
- **Hours:** 2h 2h
- **Season:** Sum
- **Type:** Written
- **Credit:** 5

**Topics in theoretical computer science**

- **Course Code:** CS-455
- **Instructor:**
- **Hours:** 3h 1h
- **Season:** Win
- **Type:** During the semester
- **Credit:** 6

**Virtual reality**

- **Course Code:** CS-444
- **Instructor:** Boulle
- **Hours:** 2h 1h
- **Season:** During the semester
- **Type:** Sum
- **Credit:** 6

**Visual intelligence : machines and minds**

- **Course Code:** CS-503
- **Instructor:** Zamir
- **Hours:** 2h 1h 1h
- **Season:** During the semester
- **Type:** Sum
- **Credit:** 6

**Master project**

<table>
<thead>
<tr>
<th>E</th>
<th>Courses</th>
<th>Master 1</th>
<th>Master 2</th>
<th>MP Autumn</th>
<th>MP Spring</th>
<th>Exam</th>
<th>Exam</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Language Code: Engineering internship credited with Master project (master in Data science)</td>
<td>p l e p l e p l e p</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Section: Profs divers</td>
<td>320h</td>
<td>320h</td>
<td>320h</td>
<td>320h</td>
<td>Sum</td>
<td>Win</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Language Code: Master project in Data science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Section: Profs divers</td>
<td>900h</td>
<td>900h</td>
<td></td>
<td></td>
<td>Sum</td>
<td>Win</td>
<td>30</td>
</tr>
</tbody>
</table>

C: Courses, E: Exercice, P: Pratic courses, *: option courses / F: French courses, D: Deutsch courses, E: English Courses / Sum: Summer, Win: Winter