### Computer Science GENERAL
- **CS CORE**: [Computer Ethics](#) (SEC, 1B)
- **CORE SPECIALIZATION COURSES** (20 EC): 4 mandatory courses
- **ADVANCED SPECIALIZATION COURSES** (15 - 20 EC): Choice 3 or 4 out of x
- **profil**ING SPACE (30 EC): Electives from other CS specializations or related Master’s programmes (EE, EMSYS, BIT, ITECH, AM), Internship, Exchange.

Some specializations have additional requirements, e.g. socio-technical courses, orientation.
- **GRADUATION** (40 EC): Research Topics (10EC) (preparation) + Final project (30EC) (project)

### SPECIALIZATION SOFTWARE TECHNOLOGY

<table>
<thead>
<tr>
<th>Mandatory core (20 EC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design of Software Architecture</td>
</tr>
<tr>
<td>Software Testing and Risk Assm.</td>
</tr>
<tr>
<td>Principles of programming, processes and patterns</td>
</tr>
<tr>
<td>System Validation</td>
</tr>
</tbody>
</table>

**Advanced (at least 4)**

- Advanced Logic | 4 |
- Graph Algorithms and Complexity | 2 |
- Software Management | 4 |
- Interactive Theorem Proving | 2 |
- ADSA-Model driven engineering | 1 |
- Service-oriented Architecture with Web services | 3 |
- Modeling and Analysis of Concurrent Systems | 1 |
- Software Evolution | 3 |

**Design orientation (10 EC)**

- Industrial Software Engineering project Sem 1

**Research orientation (10 EC)**

- Software Science | 13, 14, 15, 16 | 3, 4
- Capita selecta ST Year

### SPECIALIZATION SOFTWARE TECHNOLOGY

**Mandatory core (20 EC)**

- Internet security | 3 |
- Software Security | 2 |
- Security & cryptography (TUD) | 1 |
- Cyber risk management (TUD) | 1 |

**Advanced (at least 3)**

- Secure Data Management | 1 |
- Secure Cloud Computing | 1 |
- Security Services for IoT | 4 |
- Security Verification Year |
- System Security | 4 |
- System Validation | 1 |
- Cyber Data Analytics (TUD) | 4 |
- Privacy Enhancing Techn. (TUD) | 4 |
- Intr. to Biometrics | 2 |
- Blockchain and distr. ledger techn | 3 |
- Emp. Security Analysis & Eng. | 1 |

**Socio-Technical (3 courses out of 4)**

- Cyber-crime science Sem 2
- E-Law | 4 |
- Economics of security (TUD) | 1 |
- Capstone Cyber security | 1, 3, 4 |
- Cyber security management | 2 |
- User-centered security (TUD) | 4 |
- Cloud as infrastructure(TUD) | 2 |

### SPECIALIZATION CYBER SECURITY

**Mandatory core (20 EC)**

- Managing big data | 2 |
- Data science | 2, 3 |
- Machine learning | 1 |
- Information theory and statistics | 3 |

**Advanced (at least 4)**

- Machine Learning 2 | 2 |
- Foundations of IR or Natural Language Processing | 1 |
- Image Processing and Computer Vision |
- Deep Learning – theory to practice | 2 |
- DST Architectures of IS | 4 |
- DST Probabilistic programming | 3 |
- SDS Adv. Techniques for Signal Analysis | 3 |
- SDS Time Series Analysis | 4 |
- SDS Sports Interaction Technology | 4 |
- SDS Data Science add. topics | 2, 3 |

### SPECIALIZATION DATA SCIENCE AND TECHNOLOGY and SPORT DATA SCIENCE

**Mandatory core (20 EC) DST & SDS**

- Internet security | 3 |
- Performance evaluation | 2 |
- Mobile and wireless networking | 3 |
- Internet of Things | 1 |

**Advanced (at least 4)**

- Advanced Networking | 1 |
- Service-oriented Architecture with Web services | 3 |
- Cloud Networking | 2 |
- Ad-Hoc Networks | 4 |
- Internet Measurements | 4 |
- Pervasive Computing | 3 |
- Distributed Systems | 2 |
- Security Services for IoT | 4 |
- Empirical Security Analysis and Engineering |
- Dependable Networking Year

### SPECIALIZATION INTERNET SCIENCE AND TECHNOLOGY

**Mandatory core (20 EC)**

- Internet security | 3 |
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- Mobile and wireless networking | 3 |
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### NOTE!
This is Simplified overview. For a more complete overview and info on additional courses and requirements visit
- Cyber Security: [www.4tu.nl/cybsec](#)
- Software Technology: [www.utwente.nl/en/eemcs/fmt/education/st/](#)
- Data Science and Technology: [www.utwente.nl/en/csc/programme/specializations/data-science-and-technology/](#)

Quartiles: 1 (Sep-Nov), 2 (Nov-Feb), 3 (Feb-Apr), 4 (Apr-Jul); Year = can be started anywhere during the year; Sem = runs over a semester

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