The Joint Cybersecurity Master's Programme and Cybersecurity courses offered

Information meeting for students Spring 2025

https://uni.hi.is/helmut/cybersecurity/

Why is cybersecurity important?
or: why to study it!

- Modern society relies heavily on many online services
  (e-commerce and banking, health sector, transportation, communication, utilities,
  i.e. critical infrastructure).

- Ever increasing amounts of data is collected and processed by various actors (all
  online transactions, AI and ML, etc.).
  We need to protect private users and companies against data thefts and losses.
  Sensitive data should be kept safe (and yet usable for legitimate purposes).

- Securely designed systems are also a business enabler.
  Relevant skills are needed in designing, implementing and validating them!

Teachers involved

- Ásta Guðrún Helgadóttir, **UoI**, `astagh`

- Esa Hyytiä, **UoI**, `esa`

  Use this username for emailing.
  Email addresses at UoI end with @hi.is

- Fatima Errounda, **RU**, `fatima`

  Use this username for emailing.
  Email addresses at RU end with @ru.is

- Hans Reiser, **RU**, `hansr`

- Helmut Neukirchen, **UoI**, `helmut`

  + external teachers, e.g. Rey Leclerc Sveinsson & Svavar Ingi Hermannsson at UoI

- Jacky Mallett, **RU**, `jacky`

  + visiting scholars (from US via Fulbright, from NTNU Norway)

- Tom Welsh, **UoI**, `tomwelsh`

Joint master's programme in cybersecurity

- Joint programme at University of Iceland and Reykjavik University.

  - Specialisation/emphasis of the existing M.Sc. programmes in Computer Science.
    (Cysec specialisation also for M.Sc. in Software Engineering at UoI since autumn 2024.)

    - Intent: add a specialisation/emphasis of the existing M.Sc. programmes.

    - Planned to become in future a study programme on its own.

    - You can still (now or later) change over into that specialisation/emphasis.

- Taught in English to attract as many students as possible.

How does it work?

- Students enroll in the M.Sc. programme at the university of their choice.
  - Take "normal" M.Sc. Computer Science courses + mandatory courses specific to Cybersecurity.
  - Can take **cybersecurity-related course** from the other university as well.
    - This applies only to students who are enrolled in the cybersecurity specialisation/emphasis! (But: as long as student numbers are low, we try to get other students in as well on a best-effort basis).
    - Need to enrol as guest student at the other university: You need to refer to cysec collaboration to get fees waived.
    - Currently: Credits need to be manually registered at home university.
      (UoI: currently, course name does not show up in UoI record, but only as "credits from another university". Get a document from RU if want to be able to show the course name.)
    - Of course, students can always take the cybersecurity courses from their own university.
  - Import additional distance learning courses from abroad, e.g.:
    - Norwegian University of Science and Technology (NTNU Trondheim/Gjøvik, Norway).
    - Aalto University (Helsinki, Finland).

Teaching periods

- RU:
    - First 12 weeks of parallel courses:
        - Teaching period: 13. January to 4. April,
        - Exam period: 7. April to 25. April.
    - Followed by 3 weeks of a single, all-day course:
        - Teaching period: 28. April to 16. May,
        - Exam/assessment: 19. May or 20. May.

        Source: https://en.ru.is/studies/calendar/season-2024-2025/#tab2

- UoI:
    - Teaching period: 13. January to 15. April,
    - Exam period: 22. April to 8. May.

        Source: https://www.hi.is/nam_verkfraedi_og_natturuvisindasvid/kennslualmanak_verkfraedi_og_natturuvisindasvids

UoI students can take these 3 week courses, but have to tell RU teacher if they cannot attend on specific days due to exams at UoI.

Courses offered at RU (12 week + 3 week)

HÁSKÓLINN Í REYKJAVÍK
REYKJAVIK UNIVERSITY

UNIVERSITY OF ICELAND

Vorönn/Spring 2025

Course			Code	ECTS	Language
Business Intelligence	⬆	➕	I-707-VGBI	ECTS 6	🇮🇸
Operating Systems	⬆	➕	T-215-STY1	ECTS 6	🇬🇧
Engineering Optimization	⬆	➕	T-423-ENOP	ECTS 6	🇬🇧
Programming Languages	⬆	➕	T-501-FMAL	ECTS 6	🇮🇸
User-Centered Software Development	⬆	➕	T-515-NOTH	ECTS 6	🇬🇧
Software Maintenance	⬆	➕	T-533-VIHU	ECTS 6	🇮🇸
Mechatronics II	⬆	➕	T-535-MECH	ECTS 6	🇬🇧
Design and Analysis of algorithms	⬆	➕	T-604-HGRE	ECTS 6	🇬🇧
Artificial Intelligence	⬆	➕	T-622-ARTI	ECTS 6	🇬🇧
Advanced Game Design & Development	⬆	➕	T-634-AGDD	ECTS 6	🇮🇸
Game Engine Architecture	⬆	➕	T-637-GEDE	ECTS 6	🇬🇧
Research Methodology	✅		T-701-REM4	ECTS 8	🇬🇧
Modeling and Verification	⬆	➕	T-707-MOVE	ECTS 8	🇬🇧
Fundamentals of Machine Learning		➕	T-711-FOML	ECTS 8	🇬🇧
Speech Processing		➕	T-715-SPPR	ECTS 6	🇬🇧
Empirical Research in Software Engineering, Information Systems, and Human-Computer Interaction		➕	T-741-ERSE	ECTS 8	🇬🇧
Cyber Security Management & Compliance in Practice		➕	T-746-COPS	ECTS 8	🇬🇧
Reverse Engineering and Malware Analysis		➕	T-748-REMA	ECTS 6	🇬🇧
Introduction to Industrial Control security	⬆	➕	T-749-ICIS	ECTS 8	🇬🇧
Autonomous Robotics		➕	T-756-AUTO	ECTS 8	🇬🇧
Big Data Management	⬆	➕	T-764-DATA	ECTS 8	🇬🇧
Applied Data Science	⬆	➕	T-786-APDS	ECTS 6	🇬🇧
MSc Thesis (30 ECTS)		➕	T-810-MTPR	ECTS 24	🇬🇧
Creating a Complete Business Plan for a Technical Idea - Entrepreneurship and the Innovation Process		➕	T-814-INNO	ECTS 8	🇬🇧
Deep Learning		➕	T-820-DEEP	ECTS 8	🇬🇧
MSc Thesis Defence (30 ECTS)		➕	T-820-MDPR	ECTS 6	🇬🇧
MSc Thesis - Part I		➕	T-830-MSTR	ECTS 30	🇬🇧
MSc Thesis - Part II		➕	T-835-MTRH	ECTS 24	🇬🇧
MSc Thesis Defence (60 ECTS)		➕	T-840-MDRS	ECTS 6	🇬🇧
Entrepreneurial Finance		➕	V-733-ENTR	ECTS 7,5	🇬🇧
Entrepreneurship and Starting New Ventures		➕	X-204-STOF	ECTS 6	🇮🇸

Legend

✅	Mandatory course on major	🇮🇸	Teaching language
➕	Optional course on major	⬆	Prerequisites for course

Autumn planning: work-in-progress – more courses to be added.

Haustönn/Fall 2025

Course			Code	ECTS	Language
Computer Security: Defence Against the Dark Arts	⬆	➕	T-742-CSDA	ECTS 8	🇬🇧
MSc Thesis (30 ECTS)		➕	T-810-MTPR	ECTS 24	🇬🇧
MSc Thesis Defence (30 ECTS)		➕	T-820-MDPR	ECTS 6	🇬🇧
MSc Thesis - Part I		➕	T-830-MSTR	ECTS 30	🇬🇧
MSc Thesis - Part II		➕	T-835-MTRH	ECTS 24	🇬🇧
MSc Thesis Defence (60 ECTS)		➕	T-840-MDRS	ECTS 6	🇬🇧

Cybersecurity MSc Programme

https://en.ru.is/course-catalogue/ →Department of Computer Science→MSc in Computer Science

Notable spring 2025 cysec courses at RU

- 12-week course (starting Jan 13):
- T-746-COPS Cyber Security Management & Compliance in Practice
  - 8 ECTS, M.Sc./3rd year B.Sc.,
  -
- T-749-ICIS Introduction to Industrial Control security
  - 8 ECTS, M.Sc./B.Sc. with at least 120 ECTS
-

- 3-week course (starting Apr 28):
- T-748-REMA Reverse Engineering and Malware Analysis
  - 6 ECTS, M.Sc.
- M.Sc. thesis
  - Computer Science: 1 or 2 semesters duration (30 or 60 ECTS). Needs to be about a CS CySec topic.
  - Software Engineering: 2 semesters duration (60 ECTS). Needs to be about a SE CySec topic.

Courses offered at UoI

Specialisation: Cyber Security (Courses in 2024-2025)

Year of study unspecified	
Fall	**Spring**
Ⓢ HBV506M Secure Software Engineering 🚩 🏳 🏴 🇬🇧 📍 6e	Ⓢ TÖL213M Applied Cryptography 🏳 🏴 🇬🇧 📍 6e
Ⓢ TÖL029M Introduction to Information Security 🇬🇧 📍 6e	Ⓢ TÖL605M Fundamentals of Ethical Hacking 🏳 🇬🇧 📍 4e
Ⓢ TÖL104M Network Measurements and Analysis 🏳 🏴 🇬🇧 📍 6e	Ⓢ TÖL204F Seminar for MS-Students 🇮🇸 📍 2e
Ⓢ TÖL431L Final project 🇳🇴 ⚓ 30e ◔	Ⓢ TÖL431L Final project 🇳🇴 ⚓ 30e ◔
Ⓢ TÖL503M Distributed Systems 🏳 🏴 🇬🇧 📍 ⚠ 6e	Ⓢ TÖL212F Governance of the Internet 🇬🇧 📍 6e
Ⓥ HBV507M Usable Privacy and Security 🏳 🇬🇧 📍 6e	Ⓥ RAF617M Fundaments of the Internet 🇮🇸 📍 6e ⊘
Ⓥ TÖL113F Quantum Cryptography 🏳 🇬🇧 ⊘ 📍 6e	Ⓥ HBV205M Software Testing 🏳 🏴 🇬🇧 📍 ⚠ 6e
Ⓥ IÐN113F Time Series Analysis 🏳 🇬🇧 🌐 ⚓ 7,5e	Ⓥ LÖG283F Privacy and Data Protection Law 📅 🏳 🇮🇸 ⊘ 📍 6e
Ⓥ REI503M Performance analysis of computer systems 🏳 🏴 🇬🇧 📍 ⚠ 6e	Ⓥ RAF620M Introduction to machine learning and artificial intelligence 🏳 🇮🇸 📍 6e
Ⓥ REI504M Cloud Computing and Big Data 🏳 🇬🇧 📍 6e	Ⓥ TÖL022F Internship in Cybersecurity 🇬🇧 📍 6e
Ⓥ REI505M Machine Learning 🏳 🏴 🇬🇧 📍 6e	Ⓥ TÖL213M Applied Cryptography 🏳 🏴 🇬🇧 📍 6e
Ⓥ TÖL022F Internship in Cybersecurity 🇬🇧 📍 6e	
Ⓥ TÖL103M Programming Projects on Internet of Things 🏳 🇬🇧 📍 6e	
Ⓥ TÖL506M Introduction to deep neural networks 🏳 🇮🇸 📍 6e	Note: TÖL113F Quantum cryptography will be in autumn (was shown for spring 2025 in the Software Engineering version of the course catalogue)
Ⓥ VON001F Thesis skills: project management, writing skills and presentation 🇬🇧 📍 💻 4e	

Fall 2024 shown above. Fall 2025 will be similar with some changes, though.

Course catalogue Computer Science M.Sc.: https://ugla.hi.is/kennsluskra/index.php?tab=nam&chapter=namsleid&id=080705_20246&kennsluar=2024&lina=10545
Course catalogue Software Engineering M.Sc.: https://ugla.hi.is/kennsluskra/index.php?tab=nam&chapter=namsleid&id=080725_20246&kennsluar=2024&lina=10547

Notable spring 2025 CySec courses at UoI

HÁSKÓLINN Í REYKJAVÍK
REYKJAVIK UNIVERSITY

UNIVERSITY OF ICELAND

TÖL=Computer Science topic / HBV=Software Engineering topic
M = M.Sc. students and 3rd year B.Sc. students, F = M.Sc. only

- TÖL605M Fundamentals of Ethical hacking
  - 6 ECTS, mandatory for UoI CySec students.
  - This course (or an RU course covering penetration testing) is a prerequisite for the autumn course HBV506M Secure Software Engineering (that is mandatory for UoI CySec specialisation).

- TÖL213M Applied Cryptography
  - 6 ECTS, mandatory for UoI CySec students.

- TÖL212F Governance of the Internet
  - 6 ECTS, mandatory for UoI Computer Science (elective for others, such as SE) CySec students.

- HBV205M Software Testing
  - 6 ECTS, elective for M.Sc. Computer Science, mandatory M.Sc. for Software Engineering.

- M.Sc. thesis
  - Computer Science: 1 or 2 semesters duration (30 or 60 ECTS). Needs to be about a CS CySec topic.
  - Software Engineering: 2 semesters duration (60 ECTS). Needs to be about a SE CySec topic.

Summary

- Check course catalogue of the two universities:
  - See URLs on slides 7 and 9.

- For particular questions, contact your university's staff or course teachers
  - (For email addresses: see slide 3).

- If you want to take a course at the other university:
  - RU student taking course at UoI: contact Helmut at UoI.
  - UoI student taking course at RU: contact Jacky at RU.

ICANN DNSSEC training
4th and 5th of February

- ICANN (the organisation that decided that there is an `.is` top-level domain) will host a technical training on DNSSEC in February.
  - DNSSEC uses cryptography to guarantee that not everyone can fake an answer to a request to resolve, e.g. `island.is`, to an IP address – but only the authoritative owner of that domain.
  - This training is for everyone who now or in future is in charge of a domain and wants to use DNSSEC to secure the address resolution of that domain.
- Dates: 4th and 5th of February 2025.
  - *"It was really interesting to see everything that goes into securing the DNS. Really good training with talented experts! Highly recommend going!"* - Kristófer Finnsson, MSc student in Cybersecurity.
  - Limited space available for students (as it is also open for industry people).
  - More information and registration here:
    https://www.icann.org/en/engagement-calendar/details/dnssec-training-at-iceland-university-2025-02-04

DNSSEC námskeið - DNSSEC Training

Registration QR code

Outlook

- Download these slides: via QR code or https://uni.hi.is/helmut/cybersecurity/
    - Still possible to register for courses!

- ICANN DNSSEC training in Iceland:
    - 4th and 5th of February 2025,
    - Free (as in free beer), but limited space and registration required.

- Questions? / Comments?

- Pizza!

- Next: Cyberclub!

Acknowledgments

- The joint cybersecurity study offerings would not be possible without funding by
  - the Ministry of Higher Education, Science and Innovation,
  - the European Union's Digital Europe Programme.
    - European Cybersecurity Competence Centre and Network (ECCC) https://cybersecurity-centre.europa.eu
      - The ECCC aims to increase Europe's cybersecurity capacities and competitiveness,
      - working together with a Network of National Coordination Centres (NCCs) to build a strong cybersecurity community.
        - In Iceland, this is Eyvör, the National Cybersecurity Coordination Centre of Iceland (NCC-IS) https://eyvor.is

Cybersecurity MSc Programme