



HÁSKÓLINN Í REYKJAVÍK  
REYKJAVIK UNIVERSITY



UNIVERSITY  
OF ICELAND

# **The Joint Cybersecurity Master's Programme and Cybersecurity courses offered**

**Information meeting for students  
Autumn 2024**



<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).
- 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!

- Jacky Mallett, RU, `jacky` ← Use this user name for emailing.  
Email addresses at RU end with `@ru.is`
- Hans Reiser, RU, `hansr`
- Esa Hyytiä, Uoi, `esa` ← Use this user name for emailing.  
Email addresses at Uoi end with `@hi.is`
- Helmut Neukirchen, Uoi, `helmut`
- Tom Welsh, Uoi, `tomwelsh`
- Kelly Caine, Visiting professor (Fulbright) at Uoi, `kelly`
- + external teachers, e.g. Rey Leclerc Sveinsson & Svavar Ingi Hermannsson at Uoi



- Joint programme at University of Iceland and Reykjavik University.
  - Specialisation/emphasis of the existing M.Sc. programmes in Computer Science.  
(Autumn 2024: Just added cysec specialisation also for M.Sc. in Software Engineering at UoI.)
    - 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.

- Students enroll in the Computer Science 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!**  
(As long as student numbers are low, we can 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. (Uol: currently, course name does not show up in Uol record.)
  - 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).

## Specialisation: Cyber Security (Courses in 2024-2025)

Year of study unspecified	
Fall	Spring
<ul style="list-style-type: none"> <li>⑤ HBV506M Secure Software Engineering 🇫🇮 🇩🇪 🇬🇧 🇮🇸 🇯🇵 6e</li> <li>⑤ TÖL029M Introduction to Information Security 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL104M Network Measurements and Analysis 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL431L Final project 🇬🇧 🇮🇸 🇯🇵 30e 🕒</li> <li>⑤ TÖL503M Distributed Systems 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e ⚠️</li> <li>⑤ HBV507M Usable Privacy and Security 🇫🇮 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL113F Quantum Cryptography 🇫🇮 🇬🇧 🇮🇸 6e</li> <li>⑤ IDN113F Time Series Analysis 🇫🇮 🇬🇧 🇮🇸 🇯🇵 7,5e</li> <li>⑤ REI503M Performance analysis of computer systems 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e ⚠️</li> <li>⑤ REI504M Cloud Computing and Big Data 🇫🇮 🇬🇧 🇮🇸 6e</li> <li>⑤ REI505M Machine Learning 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL022F Internship in Cybersecurity 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL103M Programming Projects on Internet of Things 🇫🇮 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL506M Introduction to deep neural networks 🇫🇮 🇬🇧 🇮🇸 6e</li> <li>⑤ VON001F Thesis skills: project management, writing skills and presentation 🇬🇧 🇮🇸 🇯🇵 4e</li> </ul>	<ul style="list-style-type: none"> <li>⑤ TÖL213M Applied Cryptography 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL605M Fundamentals of Ethical Hacking 🇫🇮 🇬🇧 🇮🇸 4e</li> <li>⑤ TÖL204F Seminar for MS-Students 🇬🇧 🇮🇸 2e</li> <li>⑤ TÖL431L Final project 🇬🇧 🇮🇸 🇯🇵 30e 🕒</li> <li>⑤ TÖL212F Governance of the Internet 🇬🇧 🇮🇸 6e</li> <li>⑤ RAF617M Fundaments of the Internet 🇬🇧 🇮🇸 6e</li> <li>⑤ HBV205M Software Testing 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e ⚠️</li> <li>⑤ LÖG283F Privacy and Data Protection Law 🇬🇧 🇩🇪 🇬🇧 🇮🇸 6e</li> <li>⑤ RAF620M Introduction to machine learning and artificial intelligence 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL022F Internship in Cybersecurity 🇬🇧 🇮🇸 6e</li> <li>⑤ TÖL213M Applied Cryptography 🇫🇮 🇩🇪 🇬🇧 🇮🇸 6e</li> </ul>

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





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

- HBV506M **Secure Software Engineering** (prerequisite: TÖL605M Ethical Hacking or course from RU)
  - 6 ECTS, mandatory for Uol CySec students (for those starting 2024).
- TÖL029M **Introduction to Information Security** (intro/overview, administrative and technical aspects)
  - 6 ECTS, mandatory for Uol CySec students.
- TÖL104M **Network Measurements and Analysis** & TÖL503M **Distributed System**
  - 6 ECTS, mandatory for Uol Computer Science (not: SE) CySec students.
- HBV507M **Usable Privacy and Security**
  - 6 ECTS, elective.
- TÖL022F **Internship in Cybersecurity**
  - 6 ECTS, elective. (For 2nd year M.Sc. students only.) We have placements at a few companies: contact us or you can also find your own (and contacts us).
- **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.

TÖL103M Programming Projects on Internet of Things:  
6 ECTS, includes some crypto (AES, RSA, digital signatures, checksums)

# Courses offered at RU (12 week + 3 week)



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Haustönn/Fall 2024				
+	Mathematical Programming	+	E-402-STFO	ECTS 6
+	Operation Research	+	T-403-ADGE	ECTS 6
+	Effective Programming and Problem Solving	+	T-414-AFLV	ECTS 6
+	Computer Security	+	T-417-TOOR	ECTS 6
+	Simulation	+	T-502-HERM	ECTS 6
+	Introduction to Machine Learning	+	T-504-ITML	ECTS 6
+	Computer Graphics	+	T-511-TGRA	ECTS 6
+	Theory of Computation	+	T-519-STOR	ECTS 6
+	Cyber Physical Systems	+	T-535-CPSY	ECTS 6
+	Compilers	+	T-603-THYD	ECTS 6
+	Computer Game Design & Development	+	T-624-CGDD	ECTS 6
+	Software Engineering II - Testing	+	T-631-SOE2	ECTS 6
+	Digital Health	+	T-702-MDGH	ECTS 8
+	Applied Statistics for Data Science	+	T-705-ASDS	ECTS 8
+	AI, Ethics and Society	+	T-709-AIES	ECTS 8
+	Machine Learning in Cyber Security	+	T-710-MLCS	ECTS 8
+	Applications of Digital Health	+	T-712-MADH	ECTS 8
+	Empirical Reasoning Systems	+	T-713-MERS	ECTS 8
+	FINTECH	+	T-714-FINT	ECTS 6
+	Natural Language Processing	+	T-725-MALV	ECTS 8
+	Introduction to computer-assisted proof	+	T-733-ICAP	ECTS 6
+	Virtual Humans	+	T-738-VIRH	ECTS 8
+	Software Project Management	+	T-740-SPMM	ECTS 8
+	AI Seminar	+	T-744-AISE	ECTS 2
+	Independent Study 1	+	T-749-INDS	ECTS 6
+	Statistical modelling & computation	+	T-750-SMAC	ECTS 6
+	An exploration to the ethical issues of emerging technology through the lens of Black Mirror	+	T-777-BLMR	ECTS 6
+	Data Mining and Machine Learning	+	T-809-DATA	ECTS 8
+	MSc Thesis- Project	+	T-810-MTPR	ECTS 24
+	Optimization Methods	+	T-810-OPTI	ECTS 8
+	Applied Probability	+	T-811-PROB	ECTS 8
+	Managing Research and Development - Methods and Models	+	T-814-PROD	ECTS 8
+	MSc Thesis Defence - Project	+	T-820-MDPR	ECTS 6
+	MSc Research	+	T-830-MSTR	ECTS 30
+	MSc Research Thesis	+	T-835-MTRH	ECTS 24
+	MSc Research Thesis Defence	+	T-840-MDRS	ECTS 6
+	MS Thesis	+	T-899-MSTH	ECTS 30
+	Thesis Project Defense	+	T-991-TPDE	ECTS 6
+	Exchange Studies	+	X-699-EXCH	ECTS 30

## Legend

- ✓ Mandatory course on major
- ✚ Optional course on major
- 🇮🇸 Teaching language
- 🔗 Prerequisites for course

## Vorönn/Spring 2025

+	Programming Languages	+	T-501-FMAL	ECTS 6
+	Mechatronics II	+	T-535-MECH	ECTS 6
+	Artificial Intelligence	+	T-622-ARTI	ECTS 6
+	Research Methodology	✓	T-701-REM4	ECTS 8
+	Modeling and Verification	+	T-707-MOVE	ECTS 8
+	Computer Security: Defence Against the Dark Arts	+	T-742-CSDA	ECTS 8
+	Big Data Management	+	T-764-DATA	ECTS 8
+	MSc Thesis- Project	+	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 - Project	+	T-820-MDPR	ECTS 6
+	MSc Research Thesis	+	T-835-MTRH	ECTS 24
+	MSc Research Thesis Defence	+	T-840-MDRS	ECTS 6

Note: 12 weeks + 3 weeks semester at RU: 1 all-day course in the last three weeks at (overlapping with UoI exam period).

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





12-week course (starting Aug 21):

- T-710-MLCS **Machine Learning in Cybersecurity**
  - 8 ECTS, M.Sc./3rd year B.Sc.,
  - Practical course focussing on cyber defense (e.g. spam classification, intrusion detection) with the help of machine learning methods

3-week courses (starting Nov 11):

- T-777-BLMR **An exploration to the ethical issues of emerging technology through the lens of Black Mirror**
  - 6 ECTS, M.Sc./3rd year B.Sc.
  - Explore the ethical issues and social impact of many emerging technologies, e.g. privacy and surveillance
- T-xxx **Industrial Control Systems (ICS) security**
  - 6 ECTS, M.Sc./3rd year B.Sc.
  - Practical course in defensive cyber security with research project.

Individual projects

- Check course catalogue of the two universities:
  - See URLs on slides 6 and 8.
- For particular questions contact your university's staff or course teachers
  - (For email addresses: see slide 2).
- 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.

- Start of autumn teaching:
  - RU and Uol: 19.8.2024 (i.e. yesterday).
- Download these slides: via QR code or <https://uni.hi.is/helmut/cybersecurity/>
- Questions? / Comments?

