



Nuclear Energy Engineering Master Programme at KTH

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Physics & Nuclear Engineering

KTH Royal Institute of Technology



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Our mission

- The demand for nuclear engineers is very strong in Sweden and worldwide!
- Our programme will turn you into a nuclear engineering expert!

Example of jobs our students get after graduation:

- **Engineering positions** in nuclear-power industry (NPPs and related) on
 - analysis, simulation and optimisation related to NPP operations,
 - power plant operation and **management**, radiation protection,
 - **R&D** of reactors, fuels, materials, safety systems.
- Research/management positions in **state authority** institutions.
- Our students are successful in getting **PhD positions!**



Our alumni have positions at:

Research/Service companies	NPPs	State authorities
Westinghouse	Forsmark	SKB
Studsvik	OKG AB	SSM
Vysus Group	Ringhals	
ABB		
AFRY		
Kiwa Inspecta Nuclear AB		
Vattenfall Nuclear AB		
Uniper		
E.ON		
Fortum		

Nuclear energy today

- About 437 power reactors operating today.
- About 56 power reactors under construction.
- Over 100 power reactors on order.

Future of nuclear energy

- The demand for electricity and heat will grow in the future.
- Safety, availability and carbon-free nature of energy will play a role in the future!
- The disadvantages are being solved by SMRs and fuel reprocessing.



General info

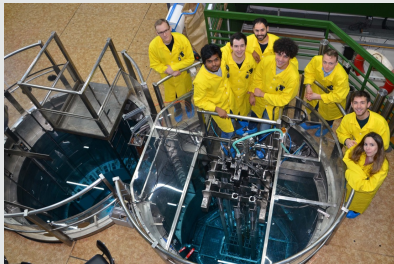
- Around 25-40 students/year enrolled in two major programmes:
 - TNEEM (our regular two-year master's programme, with the possibility to study the 2nd year at Tsinghua or KAIST and receive two diplomas)
 - EMINE (a double-degree master's programme with the 1st year at KTH and the 2nd year in France)



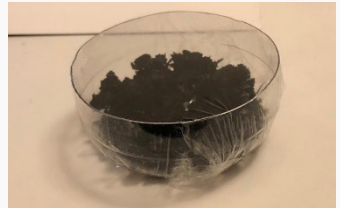
Compulsory Courses, Year 1

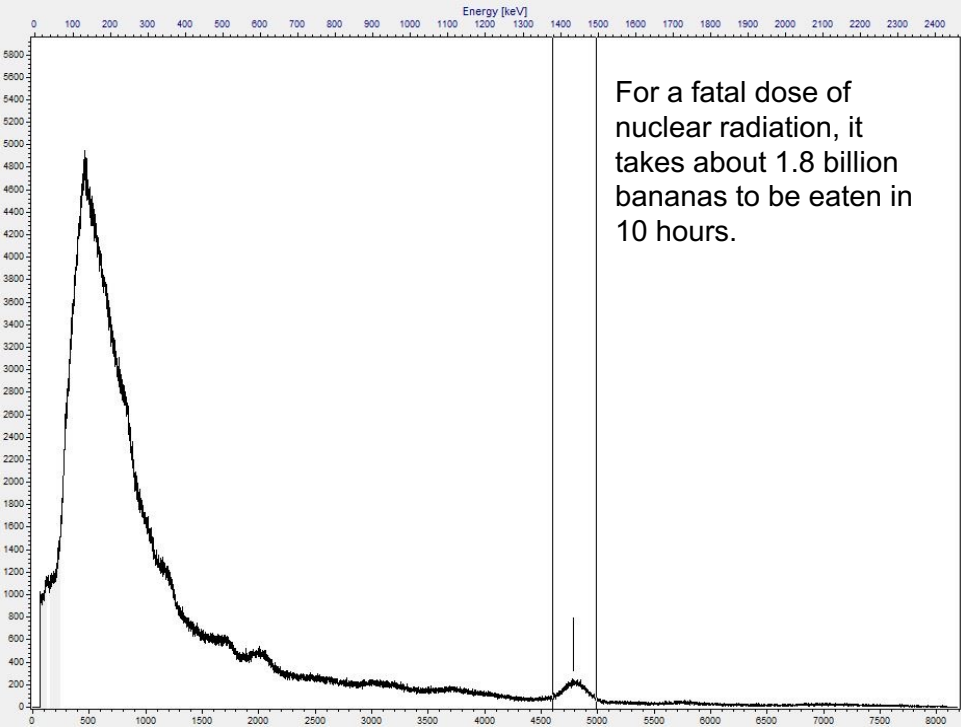
Course name	Course code	ECTS
Nuclear Reactor Physics	SH2600	9
Nuclear Reactor Technology	SH2702	8
Thermal Hydraulics in Nuclear Energy Engineering	SH2701	6
Radiation Protection, Dosimetry and Detectors	SH2603	6
Nuclear Power Safety	SH2773	6

SH2600 includes training on VR-1 reactor in Prague



Measuring the Radioactivity of Bananas





For a fatal dose of nuclear radiation, it takes about 1.8 billion bananas to be eaten in 10 hours.

Elective courses

Course name	Course code	ECTS
Sustainable Energy Transformation Technologies	SH2705	9
Monte Carlo Methods and Simulations in Nuclear Tech.	SH2704	6
Generation IV Reactors	SH2604	6
Small Reactors	SH2611	6
Radiation Damage in Materials	SH2605	6
The Nuclear Fuel Cycle	SH2614	6
Leadership for Safety in Nuclear Power Industry	SH2610	6
Numerical Methods in Nuclear Engineering	SH2774	6
Reactor Simulator (APROS)	SH2705	6
Nuclear Physics	SH2302	8
Chemistry and Physics of Nuclear Fuels	SH2772	8

Elective Courses 1/2

Course name	Course code	ECTS
Monte Carlo Methods and Simulations in Nuclear Tech. Generation IV Reactors	SH2704	6
Small Reactors	SH2604	6
Radiation Damage in Materials	SH2611	6
The Nuclear Fuel Cycle	SH2605	6
	SH2614	6



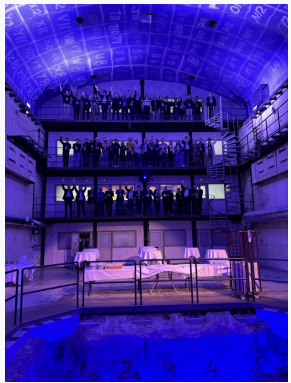
Field trip within the SH2614 course



Underground Permanent Repository for Radioactive Spent Nuclear Fuel



R1 – First Swedish Reactor



MSc Defence in R1 Reator Hall



Course name	Course code	ECTS
Leadership for Safety in Nuclear Power Industry	SH2610	6
Numerical Methods in Nuclear Engineering	SH2774	6
Reactor Simulator (APROS)	SH2705	6
Nuclear Physics	SH2302	8
Chemistry and Physics of Nuclear Fuels	SH2772	8
Sustainable Energy Transformation Technologies	SH2705	9



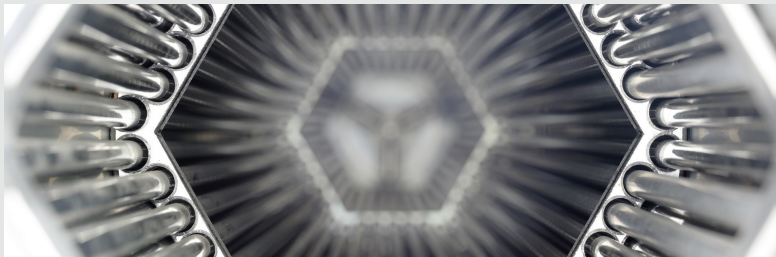
Figure 2: APROS simulator

Research in reactor physics/design/technology

- Development of small modular reactors.
- Development of risk assessment tools for nuclear power plants.
- Development of computational methods and tools.

Research in nuclear materials

- Radiation damage in materials.
- Advanced nuclear fuel materials (modelling and experiments).
- Radiation-tolerant steels and other materials (modelling and experiments).



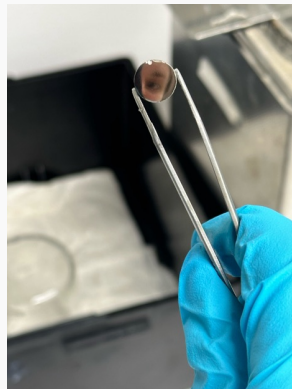
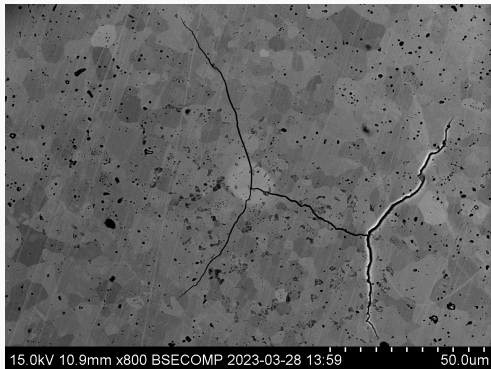
Experiments in the areas of

- Severe accidents.
- Heavy metal coolant technology.
- Research of supercritical water properties for Gen-IV reactors.



Nuclear Fuel Lab Research

Uranium Nitride Fuel Development



[Additional info about TNEEM \(Nuclear Energy Engineering\) master's programme](#)

The TNEEM home page:

<https://www.kth.se/en/studies/master/nuclear-energy-engineering>

Application deadlines for studies starting in 2023

- 16 October (2023): Application opens
- 15 January: Last day to apply
- 1 February: Submit documents
- 21 March: Admission results announced
- August: Arrival and study start

How to apply for master's studies

- Read a comprehensive info on <https://www.kth.se/en/studies/master/nuclear-energy-engineering/how-to-apply-for-masters-studies>
- Apply through University Admissions, the Swedish national application system: <https://www.universityadmissions.se/en/apply-to-masters/>
- Increase your chances by submitting a motivation letter along with other documents!

Application open

Start your application today for studies starting autumn 2024.

Apply now 



Additional Useful Info & Links

- SSSB Stockholm Student Accommodation (to sign up in the queue when you are accepted by the MSc): [SSSB](#)
- Swedish courses at KTH: [Swedish courses for international students | KTH](#)
- Distant Swedish courses at LiU (Linköping University): [Swedish for Foreign Students - level A1. Distance course, 7.5 credits - Linköping University \(liu.se\)](#)
- Swedish courses at SFI (Swedish for Immigrants): [Learn Swedish, Sfi, Swedish for immigrants. – Folkuniversitetet](#)
- Video of the R1 (first Swedish reactor on KTH campus): https://youtu.be/fw8qZ6dJVNQ?si=x5-6_uGZbF1V6Gt6
- Video of the Nuclear Fuel Lab at KTH:
- <https://youtu.be/H7e93NeohaE?si=O06VgT7dZPzF5Kli>
- https://youtu.be/pGLipn2GKqI?si=atehrD6mE_AHZLU1

[Additional info about EMINE \(European Master in Nuclear Energy\) master's programme](#)

EMINE is a two year InnoEnergy programme (120 ECTS credits) where students get a double diploma from the first and second year universities.

YEAR 1

UPC Barcelona

YEAR 1

KTH Stockholm

Summer Programme – Energy management
GEM – 2.5 weeks

YEAR 2

Paris-Saclay

1. Nuclear Reactor Physics and Engineering
2. Decommissioning and Waste management
3. Fuel cycle
4. Nuclear Plant Design,
5. Operation

YEAR 2

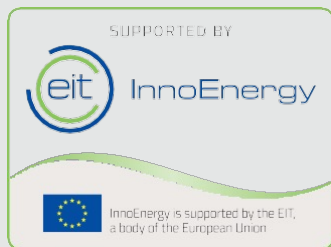
Grenoble INP

6. Material Sciences for nuclear energy. Including:
3 weeks at CEA Cadarache
2 weeks at EDF R&D
Energy school (workshop)

MASTER THESIS (5 months)

Info for EMINE applicants (not relevant for TNEEM)

- More info on <https://www.kth.se/en/studies/master/nuclear-energy/msc-nuclear-energy-eit-innoenergy>
- You can submit EMINE applications till April.
- All students (including EU citizens) pay a tuition fee (unless they get a fee waiver).



Thank you for your attention!

Questions?

