Nuclear Energy Engineering Master Programme at KTH

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Nuclear Physics & Enrineering

KTH Royal Institute of Technology

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Career opportunities

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**!

Career opportunities

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?

Advantages

- Availability (not dependent on weather/time)
- Climate neutral
- Safety (compared to all other existing sources):

Source	Number of casualties per TWh
Nuclear	0.04
Wind	0.15
Solar	0.4
Hydro	1.4
Natural gas	4
Biofuel	12
Oil	36
Coal	100

Disadvantages

Production of long-lived radionuclides; large investment to build NPPs.

Nuclear Engineering programme at KTH

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.

Nuclear Engineering programme at KTH

General info

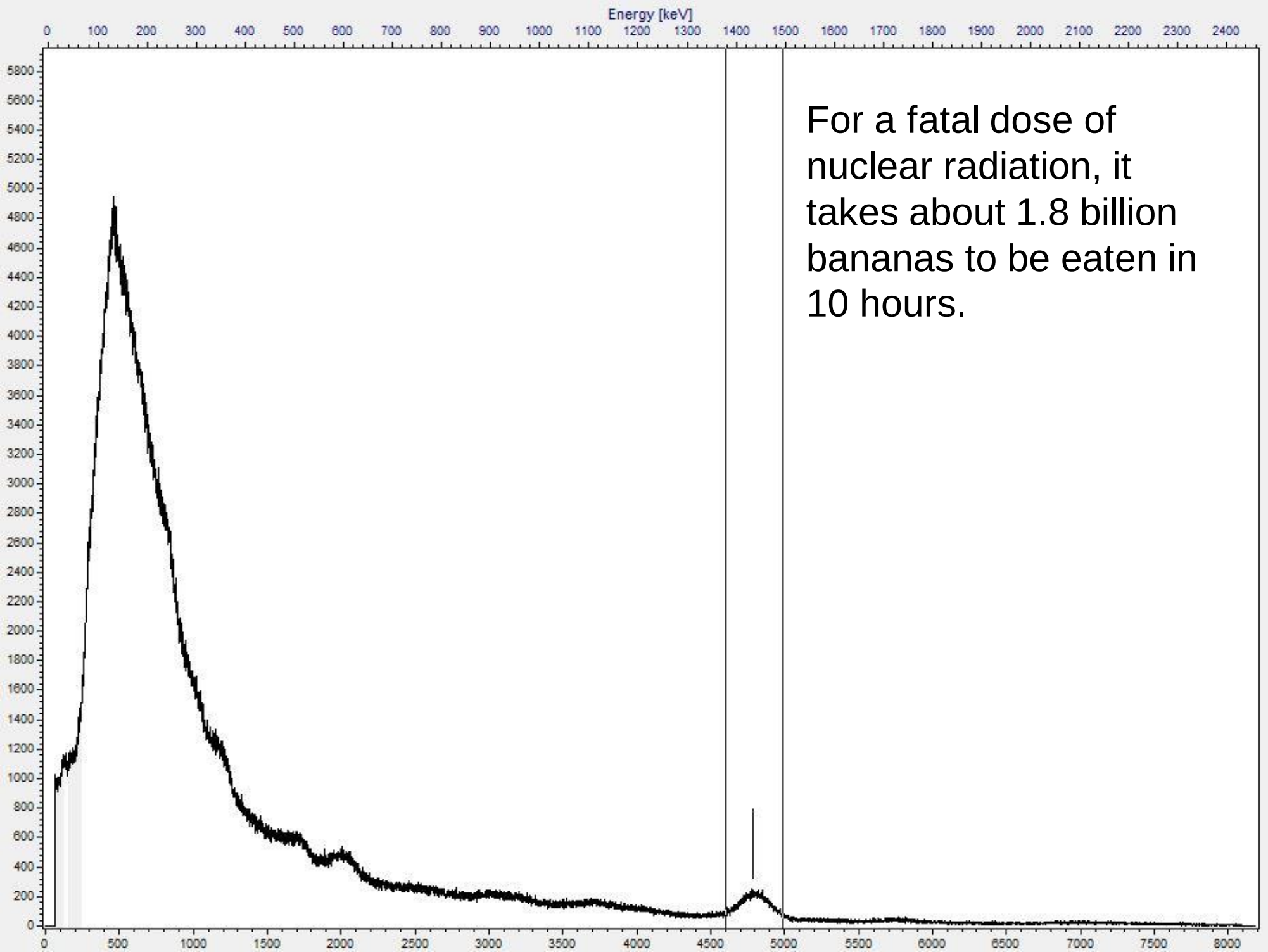
- Around 25-40 students/year enrolled in two major programmes:
  - TNEEM (our regular two-year master's programme, with the possibility to study the 2nd year at Tsinghua or KAIST and receive two diplomas)
  - EMINE (a double-degree master's programme with the 1st year at KTH and the 2nd year in France)

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 1/2

Course name	Course code	ECTS
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

Figure 1: Field trip within the SH2614course.

Underground Permanent Depository for Spent Nuclear Fuel

Elective Courses 2/2

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

Current research at Nuclear Engineering division 1/2

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.

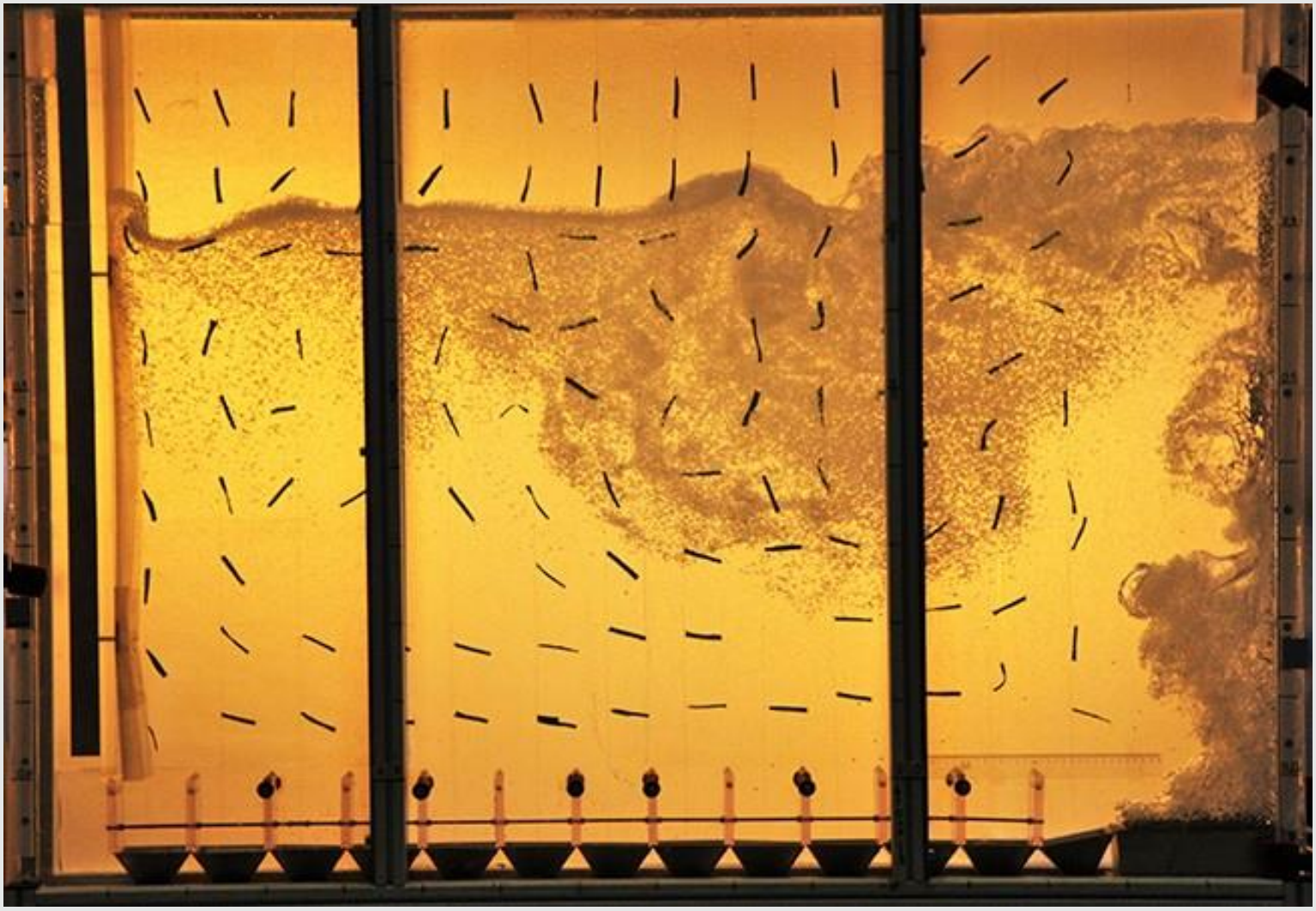
Research in nuclear materials

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

Current research at Nuclear Engineering division 2/2

Experiments in the areas of

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



Additional info about TNEEM (Nuclear Energy Engineering) master's programme

No tuition fee for EU students.

Possibility to do industrial degree projects during the 2nd year in Swedish companies such as Westinghouse, Studsvik and Vysus Group.

TNEEM master's programme

The TNEEM home page:

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

Application deadlines for studies starting in 2023

- 17 October (2022): Application opens
- 16 January: Last day to apply
- 1 February: Submit documents
- 30 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!

Additional info about EMINE (European Master in Nuclear Energy) master's programme

EMINE European Master in Nuclear Energy

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	YEAR 1
UPC Barcelona	**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 onhttps://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!