



Excellence in Analytical Chemistry: a Joint Master's Programme

www.analyticalchemistry.eu

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Erasmus+ Programme
of the European Union

EACH is ...



Co-funded by the
Erasmus+ Programme
of the European Union

- ... a full-fledged joint analytical chemistry master's degree programme (120 ECTS)
 - Highly interdisciplinary
- Tuned to the **job market** needs
 - Internship
 - Socio-economic aspects
 - Metrology topics
 - „Research-grade“ master's thesis
- **Funded by the EU's *Erasmus Mundus* scheme**



R. Rebane, A. Teearu, I. Helm, J. Bobacka, J. Randon, J. Bergquist, I. Leito. *Anal Bioanal Chem.* **2025**, 417, 1035–1047, <https://dx.doi.org/10.1007/s00216-025-05734-1>

EACH Programme structure:



Year 1

Semesters 1 and 2
Fundamentals
54 ECTS

Summer before
year 2
6 ECTS

Year 2

Semester 3
Specialisation
30 ECTS

Semester 4
Master's thesis
30 ECTS

University of Tartu

Fundamentals of analytical chemistry and bridging (T1), metrology in chemistry and quality assurance (T2), socio-economic aspects (T3), electives (T4)



Internship (IP) Typically at an associated partner

Uppsala University

Separation methods and mass spectrometry (U1), analysis of complex samples (U2), Swedish language (U3)

Master's thesis:
Uppsala or an associated partner (MT)



UPPSALA
UNIVERSITET

Åbo Akademi University

Advanced analytical devices, sensors, miniaturization, electrochemistry (A1), Swedish or Finnish language (A2)

Master's thesis:
Åbo or an associated partner (MT)



University Claude Bernard Lyon 1

Industrial analysis, process control and monitoring (L1), French language (L2)

Master's thesis:
Lyon or an associated partner (MT)



Associated partners

Industries and Labs

ARKEMA

Recipharm



AxelOne



Elkem



PRINCIPE FELIPE
CENTRO DE INVESTIGACION



UNIVERSITY OF TURKU



CHEMI-PHARM®



Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute



AUA American University of Armenia



NESTE



SSAB



Universität Regensburg



LATVIJAS
UNIVERSITĀTE



University of Zagreb



1506
UNIVERSITÀ
DEGLI STUDI
DI URBINO
CARLO BO

This presentation

- Group work „*Trace elements in drinking water*“
- Employability of the EACH graduates
- pan-European Analytical Chemistry Hub

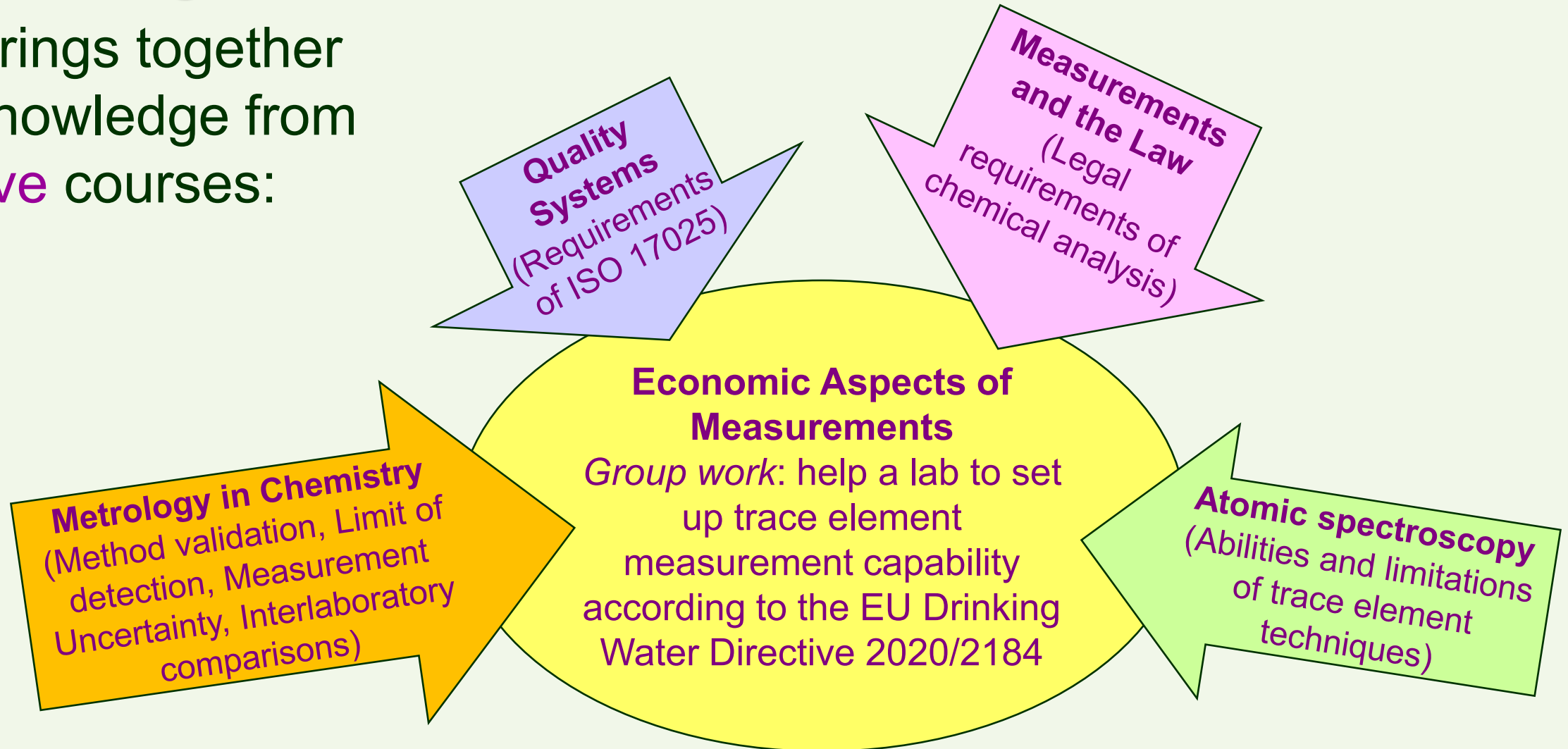
Interesting
teaching

Employability



Group work „Trace elements in drinking water“

- Brings together knowledge from **five** courses:



It is a role game

Teacher is a customer

Needs to set up **trace element analysis** at a drinking water provider in **ISO 17025 accredited** lab

Student teams are chemical analysis consultancies

- Not necessarily knowledgeable in all important issues

- Teams have to figure out what is important and give guidance

- Not necessarily providing all needed data

- Teams have to ask the right questions!

- Not always available for questions
 - Teams can have **up to two** meeting sessions (either physically or online)

- Questions have to be well prepared!

Concrete tasks for teams

Interesting
teaching

- What elements have to be determined?
 - How often? What LoD?
- Requirements for the method?
 - Which techniques can satisfy them?
- Choose the technique
 - Besides the main instrument, what else is needed in the lab?
 - What is the most cost effective technique?
 - What will be the capital expenditure?
- Requirements for method validation
 - Which method characteristics to determine and how to demonstrate compliance?
- What will be approximately the cost of analysis per sample?

Be able to extract the information from the EU Directive 2020/2184

Knowledge on trace element techniques from **Atomic Spectroscopy** course

Communication with instrument vendors: purchase costs and running costs

Requirements from the EU Directive 2020/2184

Requirements of ISO 17025 from the **Quality Systems** course

Knowledge from the **Metrology in Chemistry** course

Cost calculation of analysis from the **Economic Aspects** course

Presentation and grading

Interesting
teaching

- The task ends with **presentations** from teams
- Other teams can scrutinise and ask questions
- All teams get grades based on
 - Ability to **extract information** from the EU Directive
 - Frequency of monitoring
 - Elements to be determined
 - Required LoDs
 - Asking the **right questions**
 - Taking into account **all costs**
- **The process is more important than the result**

Examples of good questions about economy:

- Amount of water that you produce in a year?
- Salaries of staff?
- Overhead costs?
- Will you offer this analysis also as a service?

Examples of good questions about chemistry:

- Do you have staff experienced in trace element analysis?
- Is there suitable lab space?
- Do you have ultrapure water machine in the lab?
- Is there argon line in the building?

Employability of analytical chemists

Employability

 DOI: 10.1002/chem.201501364

 Guest Editorial

■ European Survey for Chemists

The Professional Status of European Chemists and Chemical Engineers

Reiner Salzer,^{*,[a]} Philip Taylor,^{*,[b]} Nineta H. Majcen,^[c] Francesco De Angelis,^[d] Sophie Wilmet,^[e] Evangelia Varela,^[f] and Ioannis Kozaris^[f]

Chem. Eur. J. **2015**, *21*, 9921 – 9935

 DOI: 10.1002/chem.201804764

 Guest Editorial

■ European Survey for Chemists

Employment and Careers of European Chemists (ESEC2)

Reiner Salzer,^{*,[a]} David Cole-Hamilton,^[b] Nineta Hrastelj,^[c] and Bruno Vilela^[d]

Chem. Eur. J. **2018**, *24*, 17370– 17388

 Chemistry–A European Journal

Guest Editorial
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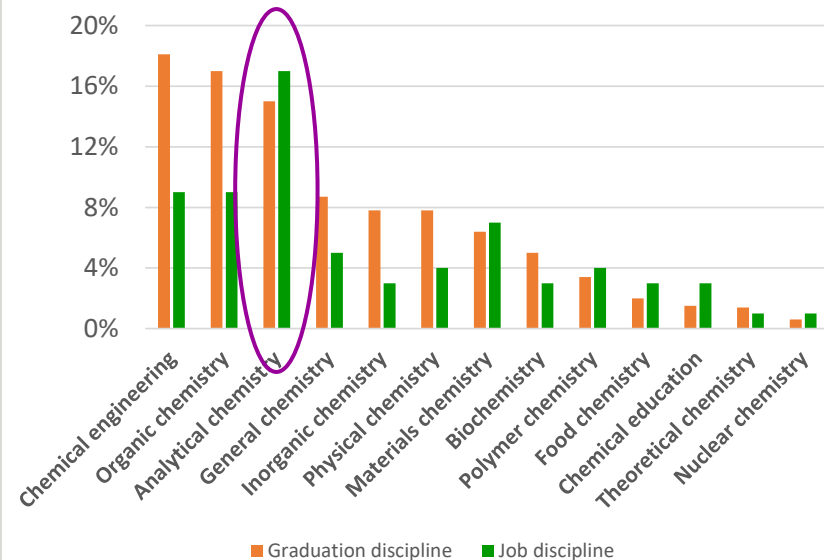
**Employment Survey for European Chemists (ESEC3)
How Diverse is Europe's Chemical Workforce?**

Reiner Salzer,^{*,[a]} Nineta Hrastelj,^[b] and Anthony Smith^[c]

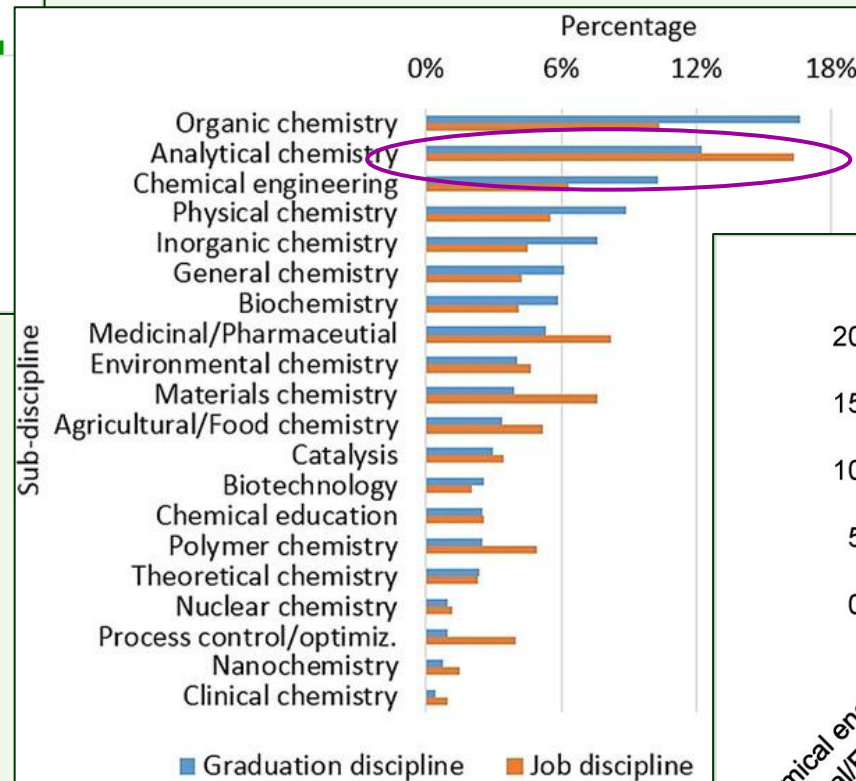
Chem. Eur. J. **2024**, *30*, e202401222

Where are the chemistry jobs?

Supply / Demand

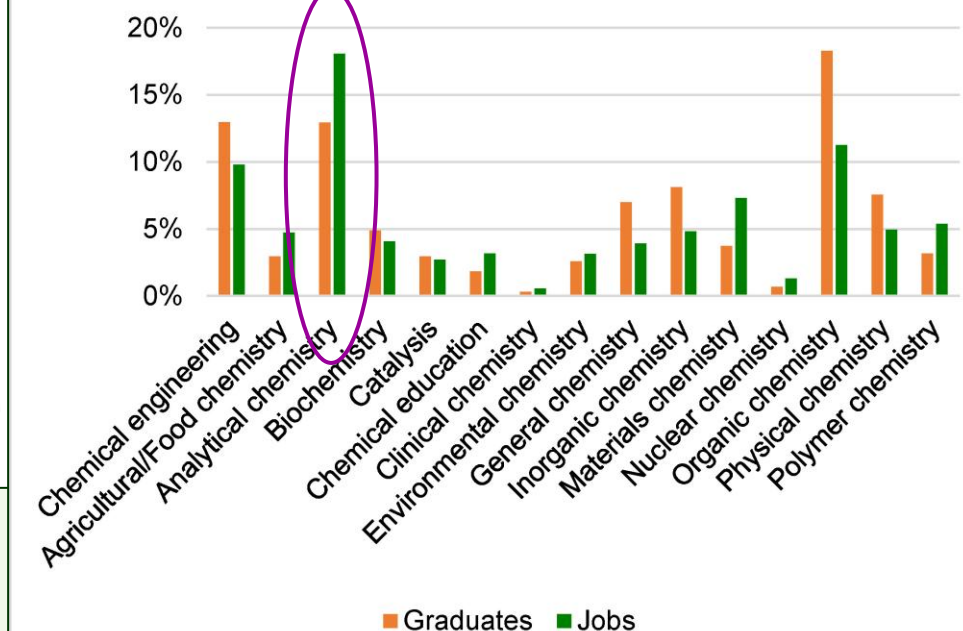


Chem. Eur. J. **2015**, *21*, 9921 – 9935



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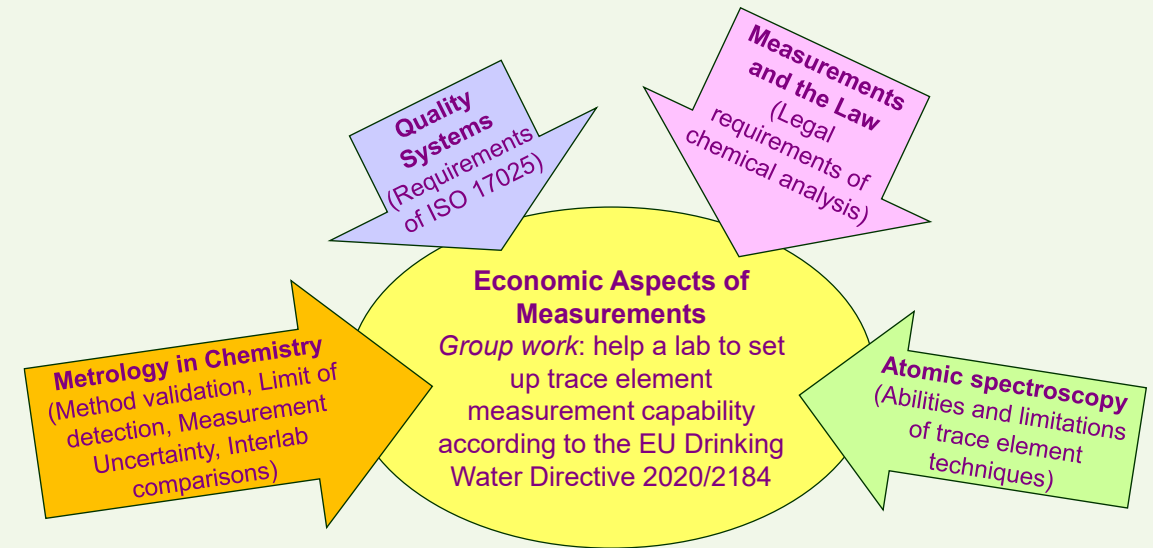
Supply / Demand



Chem. Eur. J. **2024**, *30*, e202401222

Employability in EACH

- **EACH is tuned to job market**
 - Potential employers are involved in programme development
- **„Soft“/Transferable skills**
 - Team work, presentations, time management, ...
- **Internship placement**
 - Professional network and contacts
- **Socio-economic aspects**
 - Legal requirements, Quality systems, Chemical analysis and costs, ...
- **Special guidance sessions**
 - Mini-course „How to Navigate to your Dreamjob?“ by prof. Reiner Salzer
 - Employability sessions with alumni



Career outlook

Graduates of 2024 looking back at their EACH experience: [read here](#).



Chemists having a strong background in analytical chemistry are more and more needed in industry and in industry and laboratories, in private and public sector. "Read more ..." links on the right lead to more information about what our graduates are doing after graduation.

Job requirements vary. In some places strong background in organic analysis is needed (e.g. food, pharmaceutical and clinical areas). For these chemists a high quality education in organic analytical chemistry and biomedical analysis is given at UU.

separated from each other and analytical determinations are carried out in a separate laboratory, situated often apart from the sampling site. In the future we will see more and more on-line analytical methods in many applications (e.g. when water for household consumption is prepared or in environmental monitoring). These on-line methods are sophisticated, including on-line measurement and data transfer. This field of analytical chemistry is taught at UCBL.

Traditionally the sampling and analysis steps are



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[illegible]

How to develop analytical chemistry teaching in Europe?



Developing a shared European competence framework:

- ***Competence*** is the ability to integrate and apply contextually-appropriate knowledge, skills and psychosocial factors (e.g., beliefs, attitudes, values and motivations) to consistently perform successfully within a specified domain
- This framework will align with the ***expectations of employers*** across Europe, encompassing industries, research institutions, and public-sector organizations

How to develop analytical chemistry teaching in Europe?



Aligning curricula with competence framework:

- *Using the competence framework as a reference, we will **evaluate our existing curricula** to ensure that learning objectives, teaching methods, and assessment practices are aligned.*
- *This alignment will facilitate the acquisition of **essential competences** and improve graduates' readiness for the job market.*

How to develop analytical chemistry teaching in Europe?



Creating teaching resources with a European dimension:

- *Collaborative efforts between universities, industry and stakeholders **will produce teaching resources** that reflect both the diversity and unity of European education.*
- *These resources will **enhance the capacity** of academic institutions to deliver high-quality, relevant training in analytical chemistry.*

European Analytical Chemistry Hub



- A new **platform for collaboration**, innovation, and excellence in analytical chemistry education bringing together universities, industry stakeholders, and public organisations.
- Exciting ecosystem that fosters dialogue, **resource-sharing**, and joint projects.
- Undergraduate and master's education and **ongoing professional development**,
- **Strengthen ties between institutions** and enhance the mobility of students, researchers, and professionals across countries.
- Facilitate research initiatives that address real-world challenges, **connecting academia with industry**
- Promoting sustainability and **competitiveness** in European industries.

April 2025

First survey

ELTE – HU

Turku U – FI

Oulu U – FI

BOKU – AT

UGhent – BE

EHU – ES

UIB – ES

Lyon1 – FR

Latvian U – LV

Vilnius U – LT

Two different situations :

- A full master's degree dedicated to analytical chemistry*
- A final year with more topics associated to analytical chemistry*

*We invite all interested universities to join
during September 2025*

*for a complete european survey to be performed
by the end of 2025*



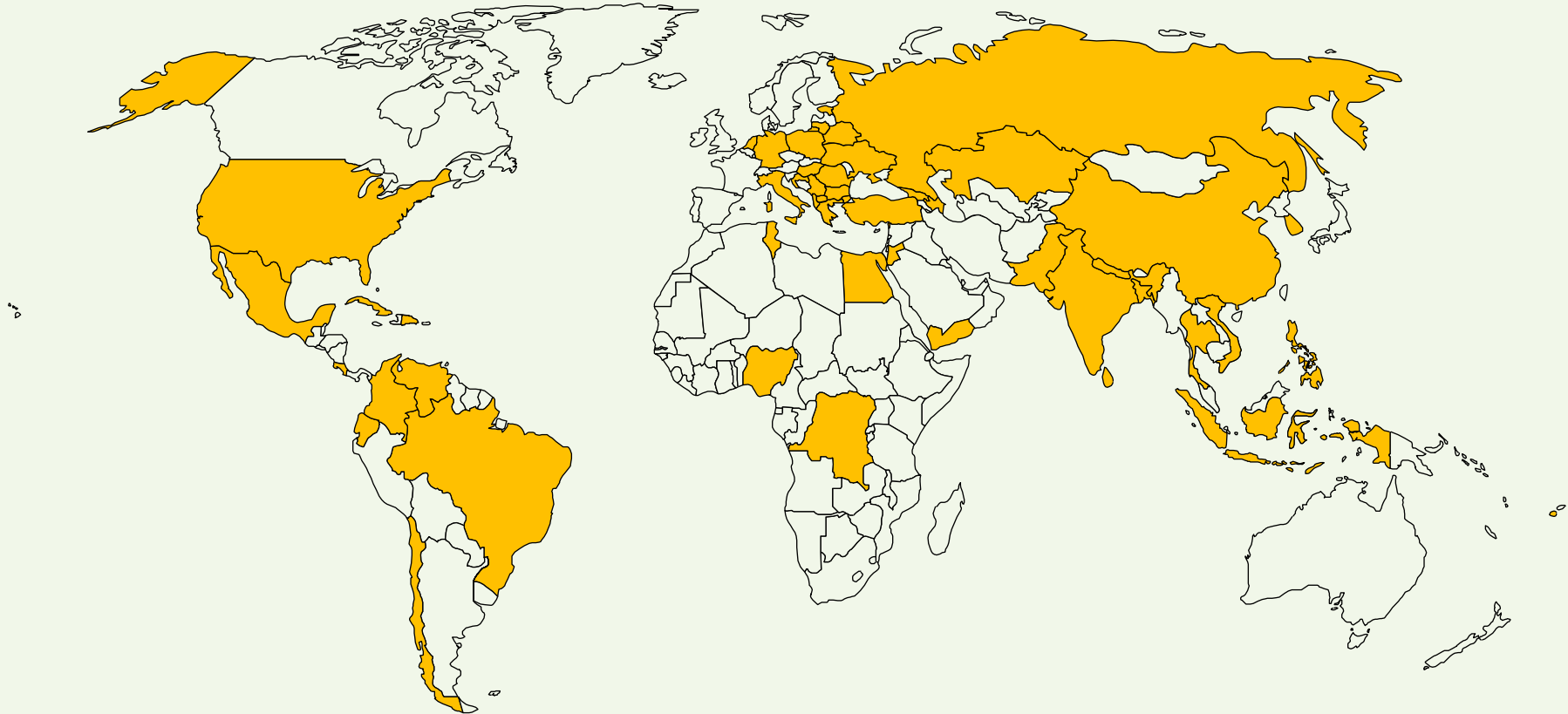
EACH Winter Schools
since 2016

01.09.2025

Where are the students from?



Countries of origin of EACH students since 2015:



Our students have come from altogether 51 countries!

**Thanks to all
our students:**



Thanks to the team!

Jonas Bergquist, Jérôme Randon, Nicole Gilon Delepine, Johan Bobacka, Ülle Tensing, Anu Teearu, Koit Herodes, Irja Helm, Riin Rebane, Magnus Strandås, Heidi Karlsson, Dana-Maria Daia, ...

Thank you for your attention!

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