



UPPSALA
UNIVERSITET



Lyon 1



Åbo Akademi
University



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

Joint Master's Programme Excellence in Analytical Chemistry

www.analyticalchemistry.eu

Ivo Leito
University of Tartu

Sample Treatment 2018, Caparica



03.12.2018



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

Excellence in Analytical Chemistry

- Started in 2015 by four European universities:



Fundamentals of analytical chemistry,
metrology in chemistry, quality assurance,
socio-economic aspects



UPPSALA
UNIVERSITET

Organic and bioorganic analysis,
advanced separation methods, mass
spectrometry



Lyon 1

Industrial analysis, process
control and monitoring



Åbo Akademi
University

Advanced analytical devices,
sensors, miniaturization,
electrochemistry

03.12.2018

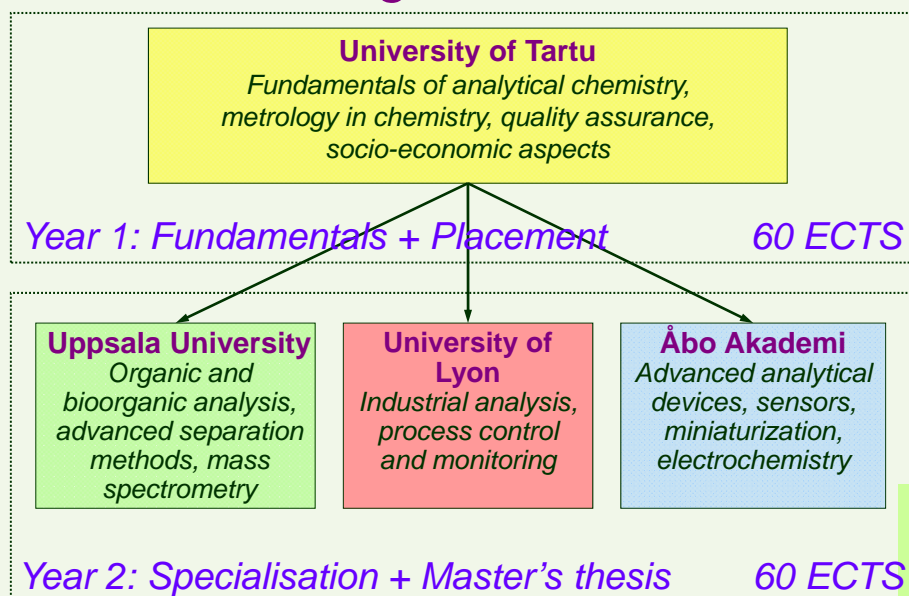
www.analyticalchemistry.eu

2



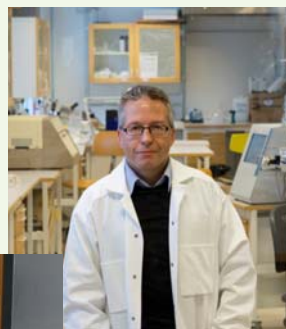
- **Full-fledged contemporary analytical master degree programme** (120 ECTS)
 - Highly international
- Tuned to the **job market** needs
 - Practical placement
 - Socio-economic aspects
 - Metrology topics
 - „Research-grade“ master's thesis
- **Funded by the EU's Erasmus Mundus scheme**

EACH Programme structure:



Academic leaders at second year universities

- Prof. Jonas Bergquist (UU)
 - A worldwide leader in biomedical LC and MS
- Prof. Jérôme Randon (UCBL)
 - Founder of the unique industrial analysis programme at Lyon
- Prof. Johan Bobacka (AAU)
 - His work on electrochemical sensors is „probing“ the future of analytical chemistry



03.12.2018

www.analyticalchemistry.eu





5

Excellence in Analytical Chemistry (120 ECTS) print XLS		
1. General Analytical Chemistry Module (21 ECTS) "and"		EACH
Principles of module selection: Obligatory for all students studying in the programme.		
LOKT.06.030	Master's Seminar in Measurement Science I (6 ECTS)	
LOFY.01.038	Measurement Data Processing (3 ECTS)	
LOKT.06.032	Practical Chemical Analysis (6 ECTS)	
LOKT.06.033	Practical Works in Chemical Analysis and Metrology (6 ECTS)	
2. Metrology and Quality Management Module (9 ECTS) "and"		
Principles of module selection: Obligatory for all students studying in the programme.		
LOKT.06.030	Metrology in Chemistry (6 ECTS)	
LTKT.06.015	Quality Systems (3 ECTS)	
3. Socio-economical Module (12 ECTS) "and" Elective		
Principles of module selection: The student has to choose at least two out of the three courses - LOKT.04.072, LOKT.06.034 or MJ.RI.10.037 - and one a foreign language course.		
LTKT.06.011	Economic Aspects of Measurements (3 ECTS)	
LOKT.04.072	Environment and Measurement (3 ECTS)	
FLLC.09.001	Estonian for Beginners I, on the Basis of English, Level D > A1.1 (6 ECTS)	
HVLC.03.006	French for Beginners I on the Basis of English, Level D > A1.1 (6 ECTS)	
LOKT.06.034	Measurements and the Law (3 ECTS)	
HVLC.06.010	Swedish for Beginners I (on the Basis of English), Level D > A1.2 (6 ECTS)	
4. Internship (6 ECTS) "and"		
Principles of module selection: Obligatory for all students studying in the programme.		
LOKT.00.023	Practical Speciality Training (6 ECTS)	
5. Elective courses (9 ECTS) "or" Elective		EACH Programme courses (1)
Principles of module selection: The student compiles the elective module independently keeping in mind the II year specialisation and the recommendations of the Programme Director.		
LOKT.06.047	Atomic Spectroscopy (3 ECTS)	
LOKT.06.043	Bridging Course in Chemistry (3 ECTS)	
LOKT.06.005	Chemometrics (6 ECTS)	
LOKT.02.035	Electrochemical Methods for Quantitative Analysis (3 ECTS)	
LTKT.06.014	Estimation of Measurement Uncertainty in Chemical Analysis (1 ECTS)	
LOKT.06.061	Introduction to Electroanalysis (3 ECTS)	
LTKT.06.016	Introduction to Forensic Analysis (1 ECTS)	
LOKT.06.064	LC-MS Methods Validation (2 ECTS)	
LOKT.06.016	Liquid Chromatography and Mass Spectrometry (6 ECTS)	
LOFY.05.051	Master's Course in Biological Physics (3 ECTS)	
LOKT.06.039	Measurement Science in Chemistry, Summer School (12 ECTS)	
LOKT.10.017	Measurements in Biochemistry (3 ECTS)	
LOFY.01.036	Measuring and Instrumentation (3 ECTS)	
LOFY.01.037	Modern Metrology (3 ECTS)	
LOFY.01.040	Practical Works on Physical Measurement and Calibration (3 ECTS)	
LTKT.06.012	Principles and Applications of Fluorescence Spectroscopy (3 ECTS)	
LOTI.02.016	Proteomics (3 ECTS)	
LOFY.01.020	Signal Processing (3 ECTS)	
LOKT.06.022	Structural Analysis I (3 ECTS)	
6. Optional subjects (3 ECTS) "and"		
Principles of module selection: Any courses taught at the University of Tartu or other HEIs.		
7. Specialisation module and language module (30 ECTS) "and"		
7.1. Specialisation module in Uppsala (30 ECTS) "or"		
Organic and bioorganic analysis and multimodal separation techniques (30 ECTS) "and"		
1KB159	Advanced Mass Spectrometry (15 ECTS)	
1KB154	Applied Analysis of Complex Samples (15 ECTS)	
7.2. Specialisation module no.2 at University C.B. Lyon (30 ECTS) "or"		

LTKT.06.011	Economic Aspects of Measurements (3 ECTS)	EACH
LOKT.04.072	Environment and Measurement (3 ECTS)	
FLLC.09.001	Estonian for Beginners I, on the Basis of English, Level 0 > A1.1 (6 ECTS)	
HVLC.03.006	French for Beginners I on the Basis of English, Level 0 > A1.1 (6 ECTS)	
LOKT.06.034	Measurements and the Law (3 ECTS)	
HVLC.06.010	Swedish for Beginners I (on the Basis of English), Level 0 > A1.2 (6 ECTS)	
4. Internship (6 ECTS) "and"		
Principles of module selection: Obligatory for all students studying in the programme.		
LOKT.00.023	Practical Speciality Training (6 ECTS)	
5. Elective courses (9 ECTS) "or" Elective		
Principles of module selection: The student compiles the elective module independently keeping in mind the II year specialisation and the recommendations of the Programme Director.		
LOKT.06.047	Atomic Spectroscopy (3 ECTS)	EACH Programme courses (2)
LOKT.06.043	Bridging Course in Chemistry (3 ECTS)	
LOKT.08.005	Chemometrics (6 ECTS)	
LOKT.02.035	Electrochemical Methods for Quantitative Analysis (3 ECTS)	
LTKT.06.014	Estimation of Measurement Uncertainty in Chemical Analysis (1 ECTS)	
LOKT.06.081	Introduction to Electroanalysis (3 ECTS)	
LTKT.06.016	Introduction to Forensic Analysis (1 ECTS)	
LOKT.06.064	LC-MS Methods Validation (2 ECTS)	
LOKT.06.016	Liquid Chromatography and Mass Spectrometry (6 ECTS)	
LOFY.05.051	Master's Course in Biological Physics (3 ECTS)	
LTKT.06.039	Measurement Science in Chemistry Summer School (12 ECTS)	
LOKT.10.017	Measurements in Biochemistry (3 ECTS)	
LOFY.01.038	Measuring and Instrumentation (3 ECTS)	
LOFY.01.037	Modern Metrology (3 ECTS)	
LOFY.01.040	Practical Works on Physical Measurement and Calibration (3 ECTS)	
LTKT.06.012	Principles and Applications of Fluorescence Spectroscopy (3 ECTS)	
LOTI.02.016	Proteomics (3 ECTS)	
LOFY.01.020	Signal Processing (3 ECTS)	
LOKT.09.022	Structural Analysis I (3 ECTS)	
6. Optional subjects (3 ECTS) "and"		
Principles of module selection: Any courses taught at the University of Tartu or other HEIs.		
7. Specialisation module and language module (30 ECTS) "and"		
7.1. Specialisation module in Uppsala (30 ECTS) "or"		
Organic and bioorganic analysis and multimodal separation techniques (30 ECTS) "and"		
1KB159	Advanced Mass Spectrometry (15 ECTS)	
1KB154	Applied Analysis of Complex Samples (15 ECTS)	
7.2. Specialisation module no 2 at University C.B. Lyon (30 ECTS) "or"		
Industrial analytical chemistry module (30 ECTS) "and"		
French language (3 ECTS) "or"		
7.3. Specialisation module at Åbo Akademi (30 ECTS) "or"		
Electroanalysis module (25 ECTS) "and"		
410304.0	Applied Electrochemistry (5 ECTS)	
410522.0	Chemical Sensors (5 ECTS)	
410517.0	Seminars in Analytical Chemistry (5 ECTS)	
410523.0	Special Project in Analytical Chemistry (10 ECTS)	
Swedish language (5 ECTS) "and"		
8. Masters' thesis (30 ECTS) "and"		
Principles of module selection: Obligatory for all students		
LOKT.00.002	Master's Thesis (30 ECTS)	

Where are the students from?

Countries of origin since 2015:

03.12.2018

Sample treatment?

Topic	Lecture	Lab UT	Lab U L A	Thesis U L A	Comments
General					
General principles of lab sampling	+	+	+++	+++	
Industrial sampling	+	-	-+-	-+-	Especially in the Lyon study track
<i>in situ</i> measurement	+	(+)	-+-	(+)++	
Sample prep techniques					
Filtration (various)	+	+	+++	+++	
Liquid-liquid extraction	+	+	++-	++-	
Solid-phase extraction, SPME	+	+	++-	++-	
QuEChERS, MSPD, ...	+	+	(+) (+) -	++-	
Sample prep in biomed analysis	(+)	(+)	-+-	(+) (-)	Especially in Uppsala
Acid digestion	+	+	-+-	-+-	
Microwave digestion	+	-	-+-	-+-	
Robots, microfluidics	+	-	-+-	+++	Lab: mostly at thesis level
Quality Assurance					
Internal/external standards, ILIS	+	+	+++	+++	Addressed throughout
Reference materials	+	+	+++	+++	Addressed throughout
Recovery, etc	+	+	+++	+++	Addressed throughout

03.12.2018

www.analyticalchemistry.eu

9

Not enough?

- Tell us!
- Come to teach at EACH as **visiting scholar!**

The screenshot shows the 'For visiting scholars' page on the EACH website. The page features the EACH logo, logos of partner institutions (Uppsala University, Lyon 1, and Abo Akademi University), and logos of funding bodies (European Union and Erasmus Programme). The main content includes a list of research areas where visiting scholars are welcome, such as new directions in analytical chemistry, food analysis, and environmental analysis. It also lists criteria and conditions for the scholarship, including a competition-based selection process and the requirement for a good command of English. A testimonial from Dr. Rostislav Kadiv is included, along with a list of navigation links on the right side of the page.

For visiting scholars

Scholars of e.g. the following research areas are very welcome to apply (non-exhaustive list)

- New and emerging directions and developments in analytical chemistry
- analytical chemistry and metrology in chemistry
- guideline materials on QA in analytical chemistry
- metrological and quality aspects of analytical chemistry
- food analysis and nutrition, QA in food analysis
- environmental analysis, e.g. with atomic mass spectrometry, isotope methods
- occupational analysis
- forensic analysis
- sensors
- automated analysis and process control

Criteria and conditions

The visiting scholar positions are competition-based. The visiting scholars are first of all expected to be outstanding experts in their respective field. In addition, a good command of English is required since the language of instruction in the EACH programme is English. Good teaching abilities are also of (week)s course(s) in his /her field etc - the scholars are offered as

www.analyticalchemistry.eu

About EACH

- Study programme
- Training placements
- Consortium
- Associated partners
- Admission information
- Scholarships and tuition fees
- Career outlook
- Practical information
- Contact
- Blog
- For visiting scholars
- EACH Winter School
- Study regulations
- FAQs
- What our students say?

Thanks to the team!

Jonas Bergquist, Jérôme Randon, Johan Bobacka, Ülle Tensing, Anu Teearu, Koit Herodes, Irja Helm, Karl Kaupmees, Hanno Evard, Magnus Strandås, Sofia Thorsélius, Heidi Karlsson, Emilie Noguez, ...

Thanks to:



Thank you for your attention!

Full information:

www.analyticalchemistry.eu

Questions, requests:

Ivo.leito@ut.ee

03.

2019 Admission to EACH is open until Jan 11, 2019

The screenshot shows the Eurachem website homepage for the 2019 event. The header includes the Eurachem logo and navigation links: Home, Program, Speakers, Registration, Venue, Sponsorship & exhibition, Visit Estonia, and Contact us. A large banner features the Eurachem logo and the text: "Eurachem week 2019", "20-21 May 2019 Workshop", and "22-24 May 2019 General Assembly". Below the banner, it says "WELCOME TO EURACHEM 2019!" and "Validation of targeted and non-targeted methods of analysis". There are four main sections: "Welcome" (inviting to the workshop and assembly in Tartu, Estonia), "Dates" (workshop on May 20th and 21st, assembly on May 23rd and 24th), "Location" (Tartu, Estonia, accessible via Tallinn), and "Validation of targeted and non-targeted methods of analysis" (the theme of the workshop). The footer contains the date "03.12.2018", the website "www.akki.ee", and the page number "12".

Validation of targeted and non-targeted methods of analysis

- Examples of issues addressed:
 - Validation of targeted methods: where are we?
 - Validation of non-targeted methods – differences from targeted methods
 - Detection of a multitude of (unknown) components in complex samples, criteria for identification
 - Managing the huge amounts of complex data from non-targeted methods
 - Software solutions for validation

www.akkiee

03.12.2018

13