EuroAnalysis
Geneva 2023

Short Courses

August 27, 2023

Short Courses

Full Day Short Courses

F01	J.-M. Roussel S. Rudaz	From method validation to method performance assessment: the benefits of the analytical methods life cycle concept
F02	F. Marini	Chemometrics

Morning Short Courses

M01	J.-L. Veuthey D. Guillarme	Supercritical Fluid Chromatography
M02	E. Bakker E. Zdrachek	Potentiometric Probes and Membrane Electrodes
M03	R. Zenobi	MALDI Mass Spectrometry
M04	C. Cao J. F. Bada Juarez	Nanopore Technology for the Detection of Biopolymers

Afternoon Short Courses

A01	M.-L. Tercier-Waeber N. Layglon	Voltammetric Sensing Devices for In Situ Trace Metal Monitoring in Aquatic Systems
A02	~~C. Sänger van de Griend~~	~~Capillary Electrophoresis applications for the analysis of biopharmaceuticals~~
A03	B. Hattendorf	Introduction to Inductively Coupled Plasma Mass Spectrometry (ICPMS)
A04	M. Marachetti-Deschmann	MALDI Imaging Mass Spectrometry
A05	D. Citterio	Paper-Based Analytical Devices
A07	R. van Staden	Trends in Bioanalysis
A08	S. Miladinovic J. Simicevic	Mass Spectrometry Analysis of Proteins: Fundamentals and Applications

Full Day Short Course

EuroAnalysis
Geneva 2023
**27-31 August 2023 Switzerland**

F01. From method validation to method performance assessment: the benefits of the analytical methods life cycle concept

Content

1   *What is the Analytical Method Life Cycle concept?*

ICH Q14 draft guideline and USP <1220> chapter insights

The analytical method performance assessment steps during method life cycle

2   *Analytical methods robustness: Why and how*

The need for a Method Operable Design Region

Use of Design of Experiments in robustness studies

Using prediction intervals in robustness assessment

3   *Method validation: the "Old" and the "New"*

A 30-year history: the 3 periods of method validation concept

To understand the "New", we must know the "Old":

"You'll be linear, Son!"

True or Accurate?

"New" concepts in calibration function assessment

Calibration functions comparison

"New" concepts in accuracy assessment

Prediction and tolerance intervals

What about uncertainty of measurements?

4   *Analytical methods on-going performance assessment*

Use of control charts for method performance monitoring

Details

Instructors	Dr. Jean-Marc Roussel Prof. Serge Rudaz
Date	27 August 2023
Time	9:00 h – 16:30 h
Duration	2 x 3 h plus lunch
Location	CICG Geneva
Fees	200 CHF (delegate) 120 CHF (student)
Included	Coffee break, lunch
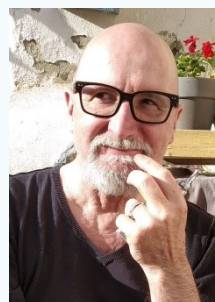
Dr. J.-M. Roussel   Prof. S. Rudaz

Instructors

Dr. Jean-Marc Roussel is an independent consultant who helps industry laboratories to develop and validate analytical methods. His consultancy activity also includes lectures and training related to liquid chromatography, sample preparation and statistics applied to analytical chemistry. He is co-designer of NeoLiCy®, software for analytical method's life cycle statistical assessment. He is chairman of the "Uncertainty of Measurement" and Co-Chairman of the "Analytical Methods Robustness" committees of the French Society for Pharmaceutical Sciences and Techniques.

Dr. Serge Rudaz is Professor at the University of Geneva where he leads the biomedical and metabolomics analysis group. He is interested in UHPLC and CE coupled to MS, advances in sample preparation, analysis of pharmaceuticals and counterfeits medicines, biological matrices, clinical and preclinical studies, including metabolism and toxicological analysis. Serge Rudaz is an expert in a variety of chemometric approaches, including experimental design (DOE) validation and regulation (ISO17025), as well as multivariate data analysis (MVA). His research group has also focused on developing chemometric approaches dedicated to the analysis of data produced by MS couplings.

F02. Chemometrics

Content

1. Introduction to chemometrics
   Data representation, from data matrices matrix to the multivariate space

2. Exploratory data analysis
   PCA and bilinear modeling. Other projection methods. Clustering

3. Predictive modeling
   Multivariate regression (MLR, PCR and PLS) and classification (PLS-DA and SIMCA)

4. Validation of chemometric models

5. Integrating information from multiple blocks of data through data fusion (hints)

Details

Instructor	Prof. Federico Marini Sapienza University, Rome, Italy.
Date	27 August 2023
Time	9:00 h–16:30 h
Duration	6 h plus coffee break
Format	Frontal Teaching and Practical Work Oral Examination
Location	CICG Geneva
Fees	200 CHF (delegate) 120 CHF (student)
Included	Coffee break, lunch

Instructor

Prof. F. Marini

Federico Marini received his MSc (2000) and PhD (2004) from Sapienza University of Rome. He is currently full professor of Analytical Chemistry at Sapienza University of Rome. In 2006, he was awarded the Young Researcher Prize from Italian Chemical Society and in 2012 he won the Chemometrics and Intelligent Laboratory Systems Award "for his achievements in chemometrics". He has been visiting researcher at various Universities (Copenhagen, Stellenbosch, Silesia, Lille).

His research activity is focused on all aspects of chemometrics, ranging from the application of existing methods to real world problems in different fields to the design and development of novel algorithms. He is author of more than 240 papers in international journals, and he edited and co-authored the book Chemometrics in food chemistry (Elsevier). He is Editor of Chemometrics and Intelligent Laboratory Systems and Frontiers in Analytical Science and member of the Editorial boards of Analytica Chimica Acta, J. of Chemometrics, J. of NIR Spectroscopy, J. of Spectral Imaging and Food Chemistry and he serves as Associate Editor for Chemometrics in Wiley's Encyclopedia of Analytical Chemistry. He has been the coordinator of the Chemometric group of the Italian Chemical Society and is currently the leader of the Chemometric study group of DAC-EuChemS.

Half Day Short Course

EuroAnalysis
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M01. Supercritical Fluid Chromatography

Content

This course covers all major aspects of supercritical fluid chromatography. The basic theory of supercritical fluids and SFC is reviewed. Currently available commercial instrumentation is discussed in relation with kinetic performance.

The strategies to develop high-quality and robust SFC methods are examined, with a focus on the choice of stationary phase and mobile phase composition (nature and proportion of co-solvent introduced in CO_2, use of additives), depending on analyte type (acidic, basic, neutral, polar or non-polar). Secondary optimization parameters (temperature, pressure, flow-rate) are also covered. Practical aspects of the hyphenation of SFC with MS are reviewed.

In addition, applications for a wide range of samples and compounds are presented and discussed at different stages throughout the course.

Details

Instructors	Prof. Jean-Luc Veuthey and Dr. Davy Guillarme, University of Geneva
Date	27 August 2023
Time	09:00–12:00 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructors

Jean-Luc Veuthey is Full professor at the School of Pharmaceutical Sciences, University of Geneva. He is author of 375 scientific publications cited more than 15'000 times. His research domain is dedicated to the development of separation techniques, mainly liquid and supercritical chromatography as well as capillary electrophoresis hyphenated with different detectors. Applications are mainly dedicated to the analysis of drugs, drugs abuse and biopharmaceutics in different biological matrices. He is also interested in the doping control analysis and is active in different national and international scientific committees.

Prof. J.-L. Veuthey

Davy Guillarme holds a Ph.D. degree in analytical chemistry from the University of Lyon, France. He is now senior lecturer and research associate at the University of Geneva in Switzerland. He authored more than 320 journal articles related to pharmaceutical analysis. His expertise includes HPLC, UHPLC, HILIC, LC−MS, SFC, SFC-MS, multidimensional LC, analysis of proteins, mAbs and ADCs. He is an associate editor of Journal of chromatography B and the recipient of the LC-GC emerging leader award in chromatography in 2013, the jubilee medal from the chromatographic society in 2018 and the international award of the Belgian society of pharmaceutical sciences in 2022.

Dr. D. Guillarme

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Half Day Short Course

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M02. Potentiometric Probes and Membrane Electrodes

Content

Membrane electrodes are ubiquitous measurement tools in analytical chemistry for the detection of a range of ionic species, including pH, and gases. They are very low power and lend themselves well for handheld and wearable applications. Yet, for many researchers their function is still a mistery. Join us and learn from experts in the field.

1   How do membrane electrodes work? Understanding underlying fundamental principles and materials aspects. Selectivity, binding constants, permselectivity

2   Principal characteristics of ionophores. Influence of structure on sensor lifetime. Design of reliable all-solid-state membrane electrodes.

3   Established and state of the art reference electrode concepts. Liquid junction potentials. Potential errors and pitfalls.

4   Practical aspects: the importance of symmetry, ion activities vs. concentration measurements, the value of membrane electrodes in speciation analysis.

5   Questions & Answers

Details

Instructor	Prof. Eric Bakker Dr. Elena Zdrachek University of Geneva
Date	27 August 2023
Time	09:00–12:00 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructors

Prof. E. Bakker

Prof. Dr. E. Bakker is professor and chair of analytical chemistry at the University of Geneva. Educated in Switzerland with a Ph.D. from ETH Zurich, he spent 14 years in the U.S. (University of Michigan, Auburn University, Purdue University) and 3 years in Australia (Curtin University in Perth) before moving to Geneva. He is a recognized expert on understanding, developing and applying chemical sensors, especially potentiometric probes and membrane electrodes. He has published about 400 papers in his career which have been globally cited on the order of 30'000 times. He serves as Executive Editor of the ACS journal ACS Sensors.

Dr. E. Zdrachek

Dr. E. Zdrachek is maître assistant in the group of Prof. Bakker and a highly experienced researcher and educator in the field of membrane electrodes. She was educated in Minsk with Prof. V. Egorov, an eminent scholar in the same field, where she received her doctoral degree. In her work she has developed a novel methodology to determine unbiased selectivities of membrane electrodes using time-dependent techniques, studied the behavior of all-solid-state and very thin membrane electrodes, explored the concept of symmetry for achieving reliable sensors and has a strong focus on environmental aquatic sensing.

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M03. MALDI Mass Spectrometry

Content

1. How exactly does MALDI work?

2. MALDI vs. other soft ionization methods

3. MALDI ionization mechanism

4. Typical applications of MALDI

5. MALDI imaging

Details

Instructor	Prof. Renato Zenobi ETH Zurich
Date	27 August 2023
Time	09:00–12:00 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructor

Dr. R. Zenobi

Prof. Renato Zenobi is Professor of Analytical Chemistry at ETH Zurich. He received a M.S. degree from ETH and a Ph.D. at Stanford University. This was followed by two postdoctoral appointments at the University of Pittsburgh and the University of Michigan. Renato Zenobi returned to Switzerland in 1992 as a Werner Fellow at the EPFL, Lausanne, where he established his own research group. He became assistant professor at the ETH in 1995, was promoted to associate professor in 1997, and to full professor in 2000. In 2010 he was appointed Associate Editor of Analytical Chemistry (American Chemical Society). He has chaired the 2014 International Mass Spectrometry Conference in Geneva, Switzerland.

Zenobi's research areas include laser-based analytical chemistry, electrospray and laser-assisted mass spectrometry, ambient mass spectrometry, and near-field optical microscopy and spectroscopy. He has made important contributions to the understanding of the ion formation mechanism in matrix-assisted laser desorption/ionization (MALDI) mass spectrometry, and to ambient ionization methods. He is well known for the development of analytical tools for the nanoscale, in particular TERS (tip-enhanced Raman spectroscopy), a spectroscopic methodology with ≈ 10 nm spatial resolution.

Renato Zenobi has received many awards for his scientific work, including the Ruzicka Prize, the Merck-Prize, the Simon-Widmer Award, honorary professorships at the Chinese Academy of Sciences (Changchun), at Hunan University, and at Changchun University of Chinese Medicine, the Thomson Medal, the 2014 RUSNANO prize, the 2015 Fresenius Award (German Chemical Society/GDCh), an ERG Advanced grant (2017), and the 2019 "Golden Owl" honoring excellent teaching at ETH Zurich.

Half Day Short Course

M04. Nanopore Technology for the Detection of Biopolymers

Content

Nanopore technology is an emerging tool for the detection of various biopolymers such as DNA and proteins. In this course, we will focus on explaining the principles of nanopore technology and emphasize on how versatile and sensitive nanopores can be for diverse applications, including DNA sequencing and protein fingerprinting. The students will have the opportunity to experiment with biological nanopores on a half-day course.

Lecture (45 min):

1. Introduction of biological nanopores: theory and data analysis
2. Nanopores for DNA and protein sequencing
3. Nanopores sensing and fingerprinting: from small molecules to proteins

Experimental training (2 h):

1. Demo on DNA detection (45-60 min)
2. Practical training (sample brought by the participants or sample given by the lecturer) (45-60 min)

Details

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Instructors	Dr . Chan Cao Dr. Juan Francisco Bada Juarez EPF Lausanne
Date	27 August 2023
Time	9:00–12:00 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructors

Prof. Chan Cao

Dr. Chan Cao is a Group leader (Prima fellow) in the school of life science at EPFL. She received her PhD in Analytical Chemistry from ECUST (Shanghai, China) in 2017, after which she worked as a postdoc fellow at EPFL.

Her research interests center around the development and application of advanced nanotechnology to study the properties, structure, dynamics and function of biomolecules of interest at the atomic and molecular levels. In particular, she is specialized in nanopore single-molecule technology, including engineering and design of biological nanopores, detection of protein biomarkers, single-molecule protein sequencing, and molecular digital data storage.
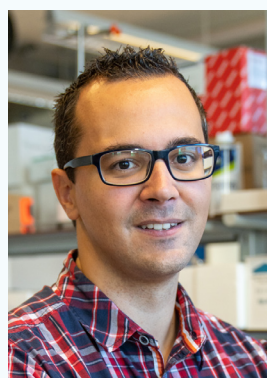
Dr. J. F. Bada Juarez

Dr. Juan Francisco Bada Juarez is a postdoc working in the lab of Dr Chan Cao at Ecole Polytechnique Fédérale de Lausanne. He was awarded his DPhil in Biochemistry from University of Oxford (UK) in 2019 and then joined Cao's lab as a postdoc to work on biological nanopores. His background is focused on membrane protein biophysics, structural biology and more specifically on protein-lipid interactions. His current main research interests are the development of biological nanopores for diverse purposes such as protein biomarkers detection and the structural characterization of novel nanopores for biotechnological applications.

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Half Day Short Course

A01. Voltammetric Sensing Devices for In Situ Trace Metal Monitoring in Aquatic Systems

Trace metals in aquatic ecosystems are highly reactive. Their dynamics play critical roles in the functioning of ecosystems, where they may act as essential micronutrients or hazardous chemicals. The relationships between metal sources, exposures and their impact on aquatic ecosystem functioning and human heath are complex. Voltammetric techniques have key features for the development of field deployable sensing tools to deeper understand these relationships. Join us and learn from experts in the field.

1.   Trace metals in aquatic systems: sources, behavior, environmental and socio-economic impacts.

2.   Criteria and challenging for development of reliable submersible voltammetric sensing devices

3.   Voltammetric techniques and innovative antifouling gel-integrated microsensors: principle, metal species selectivity, sensitivity

4.   Field applications: metal sources, temporal and spatial behavior, processes influencing metal speciation and bio-availability

5.   Demonstration: on-chip sensor preparation, detection of a range of trace metals in natural samples

Details

Instructors	Dr. Marylou Tercier-Waeber and Dr. Nicolas Layglon, University of Geneva
Date	27 August 2023
Time	13:30–16:30 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructors

Dr. M.-L. Tercier-Waeber

Mary-Lou Tercier-Waeber is research associate in the group of Prof. Bakker and leads the environmental voltammetry research direction of the group. She is a recognized expert on developing on-chip microsensors, mini/micro integrated analytical systems and submersible probes for direct quantification of specific species/fraction of trace metals and on applying these devices to detect metal sources, track their spatial spreading and temporal behaviors, and study biotic and abiotic processes that influence trace metal speciation and their potential (eco)toxicological impacts. She serves as regulator educator and consultant in these topics at the University of Geneva as well as for national and international research groups, governmental institutes, and the Italian company Idronaut.

Dr. N. Layglon

Nicolas Layglon holds a Ph.D. degree in geochemistry from the University of Toulon, France. He is specialist in trace metal cycling in coastal area. He is an experienced researcher and educator in field sampling and in laboratory analytical techniques (Voltammetry, AAS, ICP-MS, TOC, CHNS, Spectroscopy) applied to the study of metal cycling in coastal area (water, sediment, sediment-water interface. Dr. Layglon is presently PostDoc in the group of Prof. Bakker working in collaboration with Dr. Tercier-Waeber on on-going new voltammetric protocols and their field evaluation, validation and application.

Half Day Short Course

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A03. Introduction to Inductively Coupled Plasma Mass Spectrometry (ICPMS)

Content

1. Fundamental Aspects of ICPMS
   - Ion Source Characteristics
   - Mass Spectrometer Types
   - Operating Conditions
   - Figures or Merit

2. Sample Introduction
   - Solution-based
   - Solid Sampling

3. Method Development
   - Spectral Interferences
   - Matrix Effects
   - Data Acquisition

Details

Instructor	Dr. Bodo Hattendorf ETH Zurich
Date	27 August 2023
Time	13:30–16:30 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructor

Dr. B. Hattendorf

Dr. Bodo Hattendorf is a senior scientist in the Group for Trace Element and Microanalysis at ETH Zurich.

He has 25+ years of experience in ICPMS-related instrument and method development in industry and academia.

His research interests span from instrumental developments to establishing novel applications for real world analytical problems.

His experience covers all sorts of mass spectrometer types (quadrupole, sector field, time of flight and recent MS/MS technology) and various sample introduction techniques including laser ablation and single micro-droplet introduction approaches.

He has taught various short courses in (LA-) ICPMS and serves as regular instructor for ICPMS in the continuing education program of the Swiss Chemical Society.

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Half Day Short Course

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A05. (Microfluidic) Paper-Based Analytical Devices – (µ)PADs From Basics to Applications

Content

1. General introduction

2. Microfluidic patterning of paper substrates

3. Printing technologies and (µ)PADs

4. Microfluidics without valves: sequential reagent delivery, sample volume control

5. Major signal detection methods (quantitative and semi-quantitative)

6. Challenges specific to (µ)PADs

7. Selected examples of (µ)PADs

8. Questions & Answers

Details

Instructor	Prof. Daniel Citterio Keio University
Date	27 August 2023
Time	13:30–16:30 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructor

Prof. D. Citterio

Daniel Citterio is a Professor in Analytical Chemistry at the Department of Applied Chemistry of Keio University in Yokohama, Japan. He has published more than 40 papers on the topic of (microfluidic) paper-based or thread-based analytical devices, as well as other analytical approaches relying on printed analytical devices.

He has published invited review articles on this topic in Angewandte Chemie (Wiley), as well as in Lab on a Chip (RSC). His research interests include the development of low-cost analytical devices for on-site applications, as well as functional organic dyes for optical sensing and imaging. He is currently a co-Editor-in-Chief of Sensors and Actuators B: Chemical, published by Elsevier. He has also served as an international advisory board member for Analytical and Bioanalytical Chemistry (Springer Nature), as well as Analytical Chemistry (ACS).

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A07. Trends in Bioanalysis

Content

1	Principles of molecular recognition in bioanalysis
2	Tools used in bioanalysis
3	Mechanism of molecular recognition of biomolecules
4	Reliable design of the tools used in bioanalysis
5	Validation of methods used for bioanalysis
6	Applications of bioanalysis in biomedical analysis, pharmaceutical analysis, environmental analysis and food analysis.

Details

Instructors	Prof. Raluca-Ioana van Staden
Date	27 August 2023
Time	13:30 h – 16:30 h
Duration	3 h
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructor

Raluca-Ioana van Staden is a Full Professor at University Politehnica of Bucharest and the Head of the Laboratory of Electrochemistry and PATLAB Bucharest in the National Institute of Research of Electrochemistry and Condensed Matter. She received her B.Sc. degree (1992) and Ph.D. degree (1997) in chemistry from the University of Bucharest, Romania, and her habilitation in 2013.

She currently is the head of the Study group Bioanalytics, of DAC and has co-authored more than 370 journal articles, mainly in the fields of electrochemical sensors, bioanalysis (ion-selective membrane electrodes, enantioselective, potentiometric membrane electrodes, biosensors, immunosensors), process technology and flow systems (flow and sequential injection analysis), and has published three books.

She serves on the Editorial Boards of Analytical Letters, Sensors, Journal of Oncology and ECS Sensors Plus.

She has developed new types of sensors (potentiometric enantioselective membrane electrodes, biosensors and immunosensors) for the analysis of chiral drugs and she also did the modeling of interaction between enantiomer and chiral selector.

Prof. R. van Staden

She is also the initiator of simultaneous detection of enantiomers using (bio)sensors andsequential injection analysis systems.

Half Day Short Course

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A08. Liquid Chromatography/Mass Spectrometry Analysis of Proteins: Fundamentals and Applications

Content

Liquid chromatography/mass spectrometry (LC/MS) analysis of proteins is a technique used to separate, identify, and quantify proteins in complex mixtures. In the course on LC/MS analysis of proteins, participants may learn about the fundamentals of LC/MS, as well as the various types of LC/MS instrumentation systems used for protein analysis. The course will also cover the interpretation and analysis of LC/MS data, and the use of software for data processing and analysis.

In the second section of the course selected examples on proteomics applications in life sciences research will be presented. All aspects of a LC/MS research project will be covered, starting from the biological/medical question, through sample-type and -OMICS technology selection, method development and implementation, data analysis and finally interpretation of the obtained results. The section will focus on instruments utilized, quantitative approaches and computational tools, as to provide the participant with a comprehensive view of how proteomics is integrated in life science industry research.

Details

Instructors	Prof. Saša M. Miladinović HES-SO Valais-Wallis Dr. Jovan Simićević PMI Life Sciences
Date	27 August 2023
Time	13:30–16:30 h
Duration	3 h plus coffee break
Location	CICG Geneva
Fees	130 CHF (delegate) 80 CHF (student)
Included	Coffee break If booking 2 courses: lunch

Instructors

Saša M. Miladinović is Associate professor of Bioanalytical Chemistry at the University of Applied Sciences Western Switzerland (HES-SO Valais/Wallis). He received his PhD in Analytical Chemistry from the University of Arkansas followed by two post-doctoral positions at EPFL and ETH Zurich. His research interest is the development of qualitative and quantitative methods to improve the utility of analytical mass spectrometry. His experience includes protein and polymer structure elucidation by high resolution mass spectrometry, qualitative protein analysis, quantitative protein analysis using DIA, MRM, PRM. Before joining HES-SO, he worked in pharmaceutical industry as a lab head and was responsible for small molecule LC/MS bioanalysis.

Prof. S. Miladinović

Jovan Simićević holds a Ph.D. in Bioengineering from the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland. He is a senior scientist at PMI Life Sciences in Neuchâtel, Switzerland. He is an expert in disease biology, -OMICS molecular and cellular biology techniques and their application. His experience covers protein and glycan identification and structural characterization, absolute and relative quantification of proteins in human and mammalian tissue, in-vitro models, algae, and plants. He has 15+ years experience in mass spectrometry-based proteomics and method development, both in academia and industry. His research interests span from vaccine and therapeutic protein development to immunology and systems toxicology.

Dr. J. Simićević

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