





**University of
Belgrade
Faculty of
Chemistry**



University of Belgrade is a leading higher education and research institution in the Western Balkans, located in an EU Associated country, with good prospects of increasing its competitiveness at the European and global level.

THE UNIVERSITY OF BELGRADE'S FACULTY OF CHEMISTRY (UBFC)

is one of 31 faculties that form the UB and is an internationally respected center for high-quality scientific research, with the aim to maintain outstanding reputation and to meet the challenges of the 21st century.

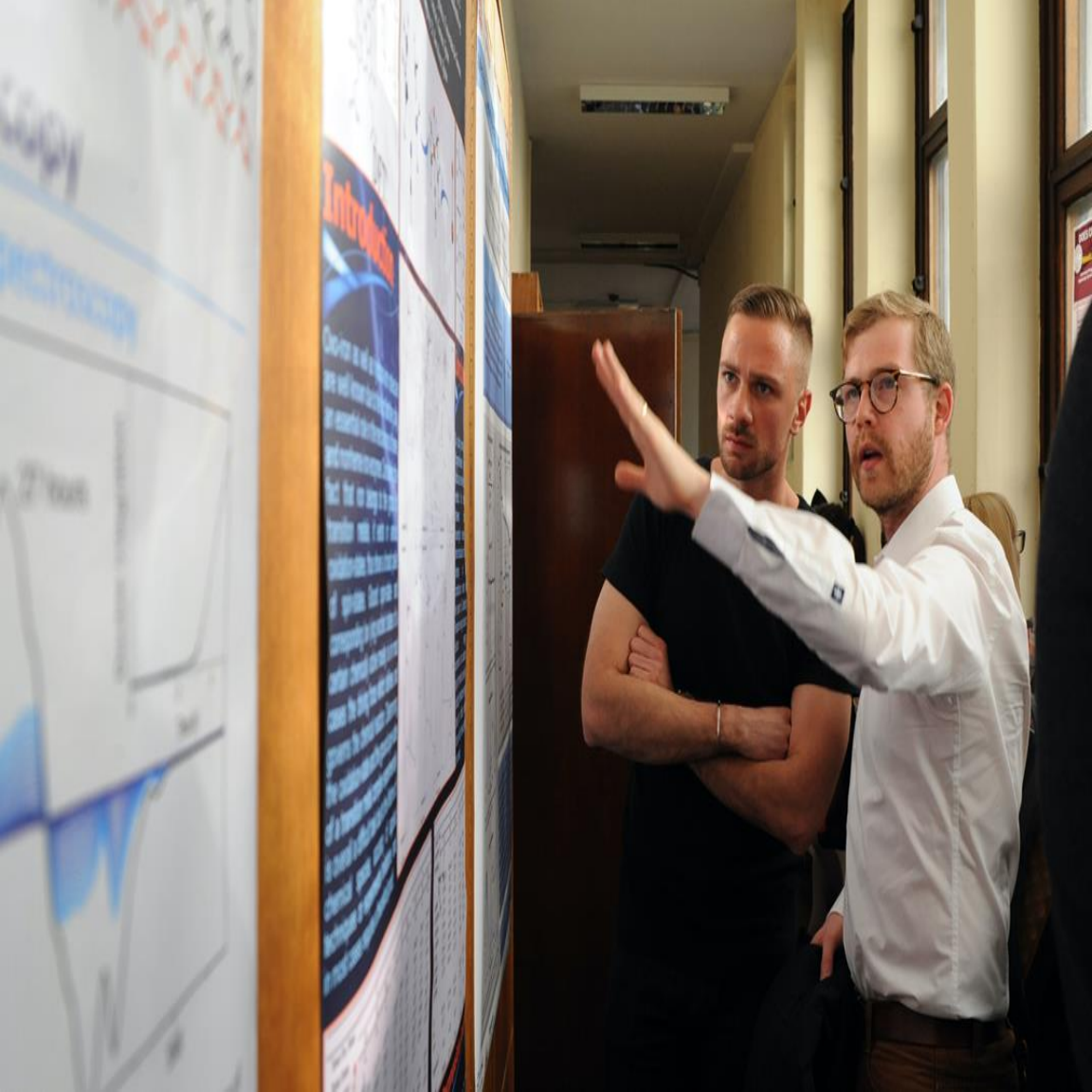


UBFC harbours the University of Belgrade's core facility for instrumental analysis, with cutting edge equipment, including NMR spectroscopy, mass spectrometry (HRMS, GCMS, GS/GS MS, IRMS, ICP-MS), microplastics and trace elemental analysis open for external users.

CENTER OF RESEARCH EXCELLENCE

UBFC represents a nationally accredited Center of research excellence for molecular food sciences, widely recognized for its expertise in:

Advanced analytical chemistry;
Omics technologies in food & environmental sciences - proteomics, metabolomics, metallomics, lipidomics;
Microplastics characterization;
food authenticity, food adulteration.



ogy

Introduction

Figure 1

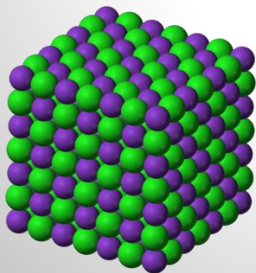
Introduction

Over the last few years, there has been a significant increase in the number of people who are using the internet to access information. This is due to a number of factors, including the fact that the internet is now available to a much larger number of people than ever before. This has led to a significant increase in the amount of information available to the public, and has also led to a significant increase in the amount of information that is being used to make decisions.

Figure 2



In addition to education at BSc, MSc and PhD levels, UBFC has experience in organization of international practical schools and short term training seminars tailored for small groups of researchers and research professionals.



HANDS-ON CONCEPT,
from sample preparation to
data analysis and reporting

Individual practical
**TRAINING FOR
INSTRUMENTAL
ANALYSIS** on NMR, HRMS,
GCMS, microFTIR with the
focus on applications in food,
nutrition and environmental
analysis;

**SAMPLE ANALYSIS AND
INTERPRETATION OF
RESULTS**

**CONSULTANCY IN
'OMICS**

TWINNING WITH TOP LEVEL EU INSTITUTIONS



METALLOMICS IN FOOD AND ENVIRONMENT

If you are a PhD student, a post-doctoral scientist, or a junior researcher, attracted to the world of metallomics, and want to know more about analytical methodologies or emerging applications in the area of metallomics, than our Metalomics School is just the right place to attend.

Our summer school offers you a large variety of lectures on fundamental research and specific topics.

It will also give you the opportunity to take part in practical sessions focusing on analytical techniques frequently used in metallomics applications.

Metallomics summer school includes an overview of theoretical concepts and experimental approaches in metallomics, as well as future challenges in the field.

PROGRAM AT A GLANCE

- Essential, non – essential and toxic elements
- Sample treatment, separation, detection approaches (ICP OES and ICP MS)
- Statistical analysis
- Analytical concepts
- Computer-assisted theoretical modeling
- Previous edition in 2019 has been attended by more than 40 PhD students and researchers.
- Instrumentation: ICP-OES, ICP-MS

foodentwin@chem.bg.ac.rs

PROTEOMICS:

PRACTICAL ASPECTS

- Dedicated to PhD students, post-doctoral scientists, or junior researchers, who aim to gain basic training in proteomics.
- An excellent opportunity for researchers from different fields to learn and share information on research, theories and especially practical aspects of proteomics.
- A space to exchange ideas and knowledge, and enable communication, networking and international collaborations.
- Opportunity to acquire new knowledge and practical skills in proteomics, discuss problems,

PROTEOMICS SCHOOL PROGRAM AT A GLANCE:

- Sample preparation
- 2D PAGE, shotgun analysis
- Mass spectrometry analysis
- Data analysis (PEAKS X PRO)
- Available instrumentation: Thermo Scientific Orbitrap Exploris 240 with UltiMate 3000 RSLCnano system
- Previous editions in 2015 and 2020 have been attended by more than 150 PhD students and researchers

LIPIDOMICS: FOOD AND FEED APPLICATIONS

- For a PhD student, a post-doctoral scientist, or a junior researcher, attracted to the world of lipidomics,
- For researchers who want to learn more about analytical methodologies or emerging applications in the area of lipidomics
- a large variety of interesting lectures on fundamental research and specific topics
- practical sessions focusing on analytical techniques frequently used in lipidomics applications.

LIPIDOMIC FOOD AND ENVIRONMENTAL APPLICATIONS PROGRAM AT A GLANCE

- An overview of theoretical concepts and experimental approaches in lipidomics, future challenges.
 - Sample treatment
 - Profiling fatty acids by gas chromatographic analysis
 - Profiling sterols by gas chromatographic analysis coupled to mass spectrometry
 - Characterization of the lipidome via high resolution mass spectroscopy
- Instrumentation: GC/MS, GC/GC/MS, Thermo Scientific LTQ Orbitrap XL with Accela UHPLC System

foodentwin@chem.bg.ac.rs

GET TO KNOW MICROPLASTICS SCHOOL

- learn more about emerging food and environmental contaminants
- a large variety of interesting lectures on fundamental research and specific topics presented by established scientists in their respective fields.
- An opportunity to take part in practical sessions focusing on contemporary analytical techniques used in microplastics research.

MICROPLASTICS SCHOOL PROGRAM AT A GLANCE:

- An overview on microplastics definition, occurrence, available methodologies for microplastics isolation and characterization.
 - Sample treatment
 - Isolation of microplastics from simple and complex matrices
 - Particle counting by fluorescence microscopy
 - Chemical characterization of microplastics by microFTIR
- Instrumentation: Thermo Scientific Nicolet iN10 microFTIR

foodentwin@chem.bg.ac.rs

METABOLOMICS TRAINING SCHOOL

- Dedicated to PhD students, post-doctoral scientists, or junior researchers, who aim to gain training in metabolomics.
- Learning outcomes-based training course:
- basics of multivariate data analysis in metabolomics,
- various analytical platforms (chromatography, mass spectrometry FTIR and NMR) used for metabolomics;
- perform sampling and sample preparation for analysis;
- create methods for MS, IR and NMR analytical platforms and
- run analysis, processing data in various software (OMNIC, CHEMSTATION, TOPSPIN, COMPASS, MESTRENOVA)
- use SIMCA for creating multivariate models (PCA, OPLS, OPLS-DA).

foodentwin@chem.bg.ac.rs

METABOLOMICS TRAINING SCHOOL

Lectures and hands-on experiments covering all aspects of metabolomics as multidisciplinary science:

- Metabolomics in food, environmental and medicinal profiling
- Sample preparation in metabolomics
- IR, GC/MS, LC/MS, NMR analysis and instrumentation
- Data analysis and processing for multivariate analysis
- Machine learning
- Case studies

METABOLOMICS TRAINING SCHOOL PROGRAM AT A GLANCE

Case studies

- Fruits profiling by Solid Phase Microextraction (SPME) GC-MS metabolomics,
 - Propolis profiling by FTIR metabolomics,
 - Chemical incident detection through plant biosensing by GC/MS and NMR metabolomics,
 - Diagnostic of Schizophrenia and Bipolar Disorder by NMR-based Metabolomics.
-
- Available instrumentation: Bruker (AVANCE III) NMR 500 MHz, Bruker MicroToF II LC/MS system, Agilent GC/MS system with CTC PAL II Sample preparation platform, Thermo Scientific Nicolet Summit FTIR

CHEMICAL FORENSICS TRAINING SCHOOL

Dedicated to PhD students, post-doctoral scientists, or junior researchers, who aim to gain training in chemical forensics and identification of substances of adulteration (SoA).

CASE STUDIES:

Fake herbal capsules for the Treatment of Erectile Dysfunction (SoA: Tadalafil and Sildenafil)

Green Coffee for Slimming (SoA: Sibutramine)

Fake herbal-based soft gelatin capsule capsules for slimming (SoA: Fluoxetine)

Dangerous designer drug in an 'Air freshener' (SoA: AB-Fubinaca)

LEARNING OUTCOMES:

- Understand the goal of various spectroscopic methods as cutting-edge tools for food safety,
- the weakness of global legislative for food supplements,
- sampling and sample preparation,
- create spectroscopic methods (MS, IR and NMR) from the scratch
- run analysis in various software
- structure elucidation
- Students will be trained to create reports valid on court.

CHEMICAL FORENCICS TRAINING PROGRAM AT A GLANCE

- Unbroken chain of custody
- Sample preparation for different analytical platforms
- FTIR, GC/MS, LC/MS and 1D and 2D NMR data collection and processing
- Structure elucidation of SoA's
- Case studies
- How to report presence of SoA to be valid on court

- Available instrumentation: Bruker (AVANCE III) NMR 500 MHz, Bruker MicroToF II LC/MS system, Agilent GC/MS system with CTC PAL II Sample preparation platform, Thermo Scientific Nicolet Summit FTIR

foodentwin@chem.bg.ac.rs

Food authenticity training school

- Dedicated to PhD students, post-doctoral scientists, or junior researchers, who aim to gain training in food authenticity testing
- Lectures and hands-on experiments covering all aspects of food authenticity testing
- Case studies

University of Belgrade - Faculty of Chemistry, together with InovaLab – accredited laboratory of the Innovative Centre of the Faculty of Chemistry, Belgrade, Ltd., are recognized as the leading Serbian laboratory for food authenticity testing.

foodentwin@chem.bg.ac.rs

FOOD AUTHENTICITY PROGRAM AT A GLANCE

- Sample preparation
- Analysis for the stable isotope ratio
- Univariate and multivariate chemometric analysis of data
- Reporting

- Case studies:
 - Authenticity testing of wine
 - Authenticity testing of honey

- Available instrumentation: Thermo Scientific Delta V advantage IRMS
foodentwinw@chem.bg.ac.rs



INDIVIDUAL PRACTICAL TRAINING FOR INSTRUMENTAL ANALYSIS

- Nuclear magnetic resonance (Bruker (AVANCE III) 500 MHz)
- High resolution mass spectrometry (Thermo Scientific Orbitrap Exploris 240, Thermo Scientific LTQ Orbitrap XL, Bruker MicroToF II LC/MS system)
- Infrared spectroscopy (Thermo Scientific Nicolet Summit FTIR, Thermo Scientific Nicolet iN10 microFTIR)
- Circular dichroism (Jasco J-815 CD)
- Gas chromatography (Agilent GC/MS system with CTC PAL II Sample preparation platform, GC/GC/MS)
- Inductively Coupled Plasma (Thermo Scientific iCAP Q ICP MS and Thermo Scientific iCAP 6500 Duo ICP OES)

SAMPLE ANALYSIS FOR EXTERNAL USERS:

www.chem.bg.ac.rs/analyze

foodentwin@chem.bg.ac.rs

NEXT EDITIONS

- Proteomics: practical aspects
 - August 2022, 10-15.
- Metalomics in food and environment
 - March 2022, 21-25
- Lipidomics: food and environmental applications
 - July 2022, 20-25
- Get to know microplastics
 - November 2022, 14-18
- Metabolomics
 - February 2023, 18-23
- Chemical forensics
 - July 2022, 18-28
- Food authenticity
 - July 2022, 17-22

✉ nauka@chem.bg.ac.rs

✉ foodentwin@chem.bg.ac.rs



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 810752.



Република Србија

Министарство просвете,
науке и технолошког развоја



Science Fund
of the Republic of Serbia

Center of research Excellence for molecular food sciences

Inovalab ISO 17025 accreditation for wine and honey authenticity testing



<http://chem.bg.ac.rs/index-en.html>



nauka@chem.bg.ac.rs



@hemijskifakultet



<https://www.facebook.com/hemijskifakulte>

tbg

*Design by Miodrag Tubacki
Published by Faculty of Chemistry*

