Course Syllabus

Code - Course Title	**KİM682 - High Resolution Mass Spectrometry: Principles and Applicati.**
Course Type	II. SEMESTER
Laboratory + Practice	3+0
ECTS	**7.5**
Language of Instruction	Türkçe
Course Type	Elective Courses
Course Instructor(s)	DR. ÖĞR. ÜYESİ SERKAN LEVENT

Mode of Delivery	Face to face
Prerequisites	There is no prerequisite or co-requisite for this course.
Courses Recomended	None
Recommended Resources	García-Reyes, J.F. Moreno-González, D. Nortes-Méndez, R. Gilbert-López, B. Molina Díaz, A.Applications in High Resolution Mass Spectrometry: Food Safety and Pesticide Residue Analysis, 2017. Liebler, D. C. Introduction to Proteomics: Tools for the New Biology. 2002. Humana Press. de Hoffmann, E., & Stroobant, V. Mass Spectrometry: Principles and Applications (3rd ed.). 2007. Wiley.
Work Placement	No

Course Syllabus

Weeks	Learning Outcomes	Topics	Teaching Methods
Week - 1		Introduction and Fundamental Concepts	
Week - 2		TOF, Orbitrap, and FT-ICR Mass Analyzers: Physical Principles and Comparative Evaluation	
Week - 3		TOF, Orbitrap, and FT-ICR Mass Analyzers: Physical Principles and Comparative Evaluation	
Week - 4		Isotopic Pattern Recognition and Molecular Formula Prediction	
Week - 5		Isotopic Pattern Recognition and Molecular Formula Prediction	
Week - 6		Interpretation of Fragmentation Pathways: MS/MS and MS^n Approaches	
Week - 7		Interpretation of Fragmentation Pathways: MS/MS and MS^n Approaches	
Week - 8		Data Processing in High-Resolution Mass Spectrometry	
Week - 9		Applications of High-Resolution MS in Omics Sciences	
Week - 10		HRMS in Environmental, Food, and Pharmaceutical Applications	
Week - 11		Artificial Intelligence and Bioinformatics Applications in High-Resolution Data	
Week - 12		Spectral Libraries in High-Resolution Mass Spectrometry	

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Weeks	Learning Outcomes	Topics	Teaching Methods
Week - 13		Literature Analyses and Practical Case Studies	
Week - 14		General Review and Current Advances	

Learning Outcomes

#	Learning Outcome
1	Explains the fundamental principles of high-resolution mass spectrometry (HRMS) and critically evaluates the physical principles of analyzer technologies.
2	Interprets isotopic distributions and molecular formula prediction processes using high-resolution data.
3	Analyzes MS/MS and MS^n data to predict possible fragmentation pathways and performs structural elucidation.
4	Performs a comparative evaluation of TOF, Orbitrap, and FT-ICR analyzers and selects the appropriate system based on analytical needs.
5	Applies data processing techniques in high-resolution spectra; evaluates signal-to-noise ratio, resolution, and mass accuracy.
6	Assesses the use of HRMS in omics sciences (e.g., metabolomics, lipidomics).
7	Interprets the advantages and limitations of HRMS in environmental, pharmaceutical, and food-related applications.
8	Analyzes the processing of high-resolution data using artificial intelligence and bioinformatics tools.

Sustainable Development Goals

No content has been provided.

Course Theme

No content has been provided.

AKTS Workload

Activity	Duration (Hour)	Count	Workload
Teorik Derse Katılım	0	0	0
Sınıf Dışı Çalışma (Ön Hazırlık & Pekiştirme Amaçlı)	0	0	0
Ödevler	0	0	0
Proje - Rapor - Sunum Hazırlama	0	0	0
Ara Sınav Hazırlığı (sınav süresi dahil)	0	0	0
Final Sınavı Hazırlığı (sınav süresi dahil)	0	0	0
Uygulama (Laboratuvar, Müzik/Enstrüman Uygulaması, Atölye/Saha Çalışması vb.)	0	0	0
Staj Uygulaması	0	0	0
		Calculated ECTS	**0**

Assessment Method and Passing Requirements

No content has been provided.