# MASS SPECTROMETRY IN ORGANIC CHEMISTRY

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| 1 | Course Title: | MASS SPECTROMETRY IN ORGANIC CHEMISTRY |
| 2 | Course Code: | KIM4052 |
| 3 | Type of Course: | Optional |
| 4 | Level of Course: | First Cycle |
| 5 | Year of Study: | 4 |
| 6 | Semester: | 8 |
| 7 | ECTS Credits Allocated: | 5.00 |
| 8 | Theoretical (hour/week): | 3.00 |
| 9 | Practice (hour/week): | 0.00 |
| 10 | Laboratory (hour/week): | 0 |
| 11 | Prerequisites: | None<br>However, it is strongly recommended that students should have read Organic Chemistry I and Organic Chemistry II. |
| 12 | Language: | Turkish |
| 13 | Mode of Delivery: | Face to face |
| 14 | Course Coordinator: | Doç.Dr. NEVİN ARIKAN ÖLMEZ |
| 15 | Course Lecturers: | Prof. Dr. Necdet COŞKUN<br>Prof. Dr. Mustafa TAVASLI |
| 16 | Contact information of the Course Coordinator: | narikan@uludag.edu.tr<br>+90 224 29 41731<br>Uludag University<br>Faculty of Sciences and Arts<br>Department of Chemistry<br>16059 Gorukle / BURSA |
| 17 | Website: | |
| 18 | Objective of the Course: | The aim of this course is to explain the basic principles and differences of the most used modern mass spectrometry techniques and to determine the structures of organic compounds using the mass spectrum |
| 19 | Contribution of the Course to Professional Development: | To learn the basic principles and differences of the most used modern mass spectrometry techniques. |
| 20 | Learning Outcomes: | |

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| | 1 | Knowing the basic aspects of mass spectrometry |
| | 2 | Learning the working principle of mass spectrometer. |
| | 3 | Knowing the modern mass spectrometry techniques and application areas |
| | 4 | Learning the determination of structures of organic compounds with Mass spectrum |
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| 21 | Course Content: |
| | **Course Content:** |

| Week | Theoretical | Practice |
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| **1** | Introduction, Principles Diagram of a Mass Spectrometer, History, Application areas of mass spectrometry. | |
| **2** | Calculation of molecular masses, mass units. | |
| **3** | Mass Spectrometer | |
| **4** | Ionization techniques; Formation and Fragmentation of Ions. | |
| **5** | Mass Analysers ; Quadrupole Analysers Ion Trap Analysers ,The Electrostatic Trap or 'Orbitrap', Time-of-Flight Analysers , Magnetic and Electromagnetic Analysers, Ion Cyclotron Resonance and Fourier Transform Mass Spectrometry , Hybrid Instruments. | |
| **6** | Detectors and Computers | |
| **7** | Mass spectrum and peak types: Molecular ion peak, Isotopic peaks, Peaks of molecular fragments, ion-molecule peaks, Double charged ion peaks, Semi-stable peaks. | |
| **8** | Problem solving | |
| **9** | Types of molecular fragmentation | |
| **10** | Molecular fragmentation according to functional group | |
| **11** | Mass spectrum, structure determination | |
| **12** | Mass spectrum, structure determination | |

| Activites | Number | Duration (hour) | Total Work Load (hour) |
|---|---|---|---|
| Theoretical | 14 | 3.00 | 42.00 |
| Practicals/Labs | 0 | 0.00 | 0.00 |
| Self study and preperation | 13 | 1.00 | 13.00 |
| Homeworks | 0 | 0.00 | 0.00 |
| Projects | 0 | 0.00 | 0.00 |
| Field Studies | 0 | 0.00 | 0.00 |
| Midterm exams | 1 | 48.00 | 48.00 |
| Others | 0 | 0.00 | 0.00 |
| Final Exams | 1 | 48.00 | 48.00 |
| Total Work Load | | | 151.00 |
| Total work load/ 30 hr | | | 5.03 |
| ECTS Credit of the Course | | | 5.00 |

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| **22** | Textbooks, References and/or Other | Edmond De Hoffmann & Vincent Stroobant, Mass Spectrometry: Principles and Applications, 3rd Edition, Wiley, 2007<br>-Jurgen H Gross, Mass Spectrometry: A Textbook, 2nd Edition, Springer, 2011<br>-J. Throck Watson & O. David Sparkman, Introduction to Mass Spectrometry: Instrumentation, Applications, and Techniques, 4th Edition, Wiley, 2007.<br>-Ender Erdik, Organik Kimyada Spektroskopik Yöntemler |
| **23** | Assesment | |
| Midterm Exam | 1 | 40.00 |
| Home work-project | 0 | 0.00 |
| Final Exam | 1 | 60.00 |
| Total | 2 | 100.00 |
| Contribution of Term (Year) Learning Activities to Success Grade | | 40.00 |
| Contribution of Final Exam to Success Grade | | 60.00 |
| Total | | 100.00 |
| Measurement and Evaluation Techniques Used in the Course | | It is evaluated by midterm exam, and final exam, which consists of classical questions, and homework. |
| **24** | **ECTS / WORK LOAD TABLE** | |

| 25 | CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS | | | | | | | | | | | | | | | |
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| | **PQ1** | **PQ2** | **PQ3** | **PQ4** | **PQ5** | **PQ6** | **PQ7** | **PQ8** | **PQ9** | **PQ10** | **PQ11** | **PQ12** | **PQ13** | **PQ14** | **PQ15** | **PQ16** |
| **ÖK1** | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK2** | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK3** | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **ÖK4** | 0 | 5 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **LO: Learning Objectives PQ: Program Qualifications** | | | | | | | | | | | | | | | | |
| **Contribution Level:** | **1 very low** | | **2 low** | | | **3 Medium** | | | **4 High** | | | **5 Very High** | | | | |