NMR SPECTROSCOPY IN ORGANIC CHEMISTRY

1	Course Title:	NMR SPECTROSCOPY IN ORGANIC CHEMISTRY	
2	Course Code:	KIM4007	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	7	
7	ECTS Credits Allocated:	6.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	0.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None However, it is strongly recommended that students should have read Organic Chemistry I and Organic Chemistry II.y	
12	Language:	English	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Prof. Dr. NECDET COŞKUN	
15	Course Lecturers:	Doç. Dr. Nevin Arıkan Ölmez Prof. Dr. Mustafa Tavaslı	
16	Contact information of the Course Coordinator:	coskun@uludag.edu.tr +90 224 29 41 725 Faculty of Arts and Science, Department of Chemistry, Görükle Campus, 16059 Bursa.	
17	Website:		
18	Objective of the Course:	The aim of the course is to provide information about the fundamentals and applications of 1H and 13C NMR techniques.	
19	Contribution of the Course to Professional Development:	To get the basic theoretical and practical knowledge on the 1H and 13C NMR technics	
20	Learning Outcomes:		
		1	Learning the fundamentals of NMR spectroscopy in liquids
		2	Having information about sample preparation, sample insertion, the shim system, tuning and matching the probe
		3	Getting knowledge about the coupling constants and chemical shifts
		4	Learning the basics of 13C NMR
		5	Characterising an organic structure by evaluating the NMR data
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21	Course Content:		
	Course Content:		
Week	Theoretical	Practice	

1	INTRODUCTION OF THE COURSE AND COURSE CONTENTS Fundamentals of NMR Spectroscopy in Liquids Introduction to NMR Spectroscopy	
2	Examples: NMR Spectroscopy of Oligosaccharides and Terpenoids Typical Values of Chemical Shifts and Coupling Constants Fundamental Concepts of NMR Spectroscopy	
3	Interpretation of Proton (1H) NMR Spectra Assignment Effect of Bo Field Strength on the Spectrum First-Order Splitting Patterns	
4	The Use of 1H–1H Coupling Constants to Determine Stereochemistry and Conformation Symmetry and Chirality in NMR The Origin of the Chemical Shift	
5	J Coupling to Other NMR-Active Nuclei Non-First-Order Splitting Patterns: Strong Coupling Magnetic Equivalence	
6	NMR Hardware and Software Sample Preparation Sample Insertion The Deuterium Lock Feedback Loop The Shim System	
7	Tuning and Matching the Probe NMR Data Acquisition and Acquisition Parameters Noise and Dynamic Range	
8		
9	Solving the Midterm exam questions Special Topic: Oversampling and Digital Filtering	
10	NMR Data Processing—Overview The Fourier Transform	
11	Data Manipulation Before the Fourier Transform Data Manipulation After the Fourier Transform	
12	Carbon-13 (13C) NMR Spectroscopy Sensitivity of 13C Splitting of 13C Signals Decoupling	
13	Heteronuclear Decoupling: 1H Decoupled 13C Spectra Decoupling Hardware	

14	Decoupling Software: Parameters The Nuclear Overhauser Effect (NOE) Heteronuclear Decoupler Modes	

22	Textbooks, References and/or Other Materials:	1) NMR SPECTROSCOPY EXPLAINED Simplified Theory, Applications and Examples for Organic Chemistry and Structural Biology. Neil E. Jacobsen. John Wiley & Sons, Inc.2007. 2) Bacic One- and Two-Dimensional NMR Spectroscopy. Horst Friebolin.Wiley-VCH Verlag GmbH&Co. KGaA.2005. 3) Nükleer Manyetik Rezonans Spektroskopisi. Prof. Dr. Metin BALCI. METU PRESS Yayınları.

23 Assesment

TERM LEARNING ACTIVITIES	**NUMBER**	**WEIGHT**
Midterm Exam	1	20.00
Quiz	0	0.00
Home work-project	1	20.00
Final Exam	1	60.00
Total	3	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		relative evaluation

24 ECTS / WORK LOAD TABLE

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	14	1.00	14.00
Homeworks	1	36.00	36.00
Projects	0	0.00	0.00
Field Studies	0	0.00	0.00
Midterm exams	1	36.00	36.00
Others	0	0.00	0.00
Final Exams	1	48.00	48.00
Total Work Load			212.00
Total work load/ 30 hr			5.87
ECTS Credit of the Course			6.00

25 CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS

	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ÖK2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ÖK5	0	0	0	0	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**