

Course Title	Organic Chemistry			
Course Code	MED-108			
Course Type	Required			
Level	Undergraduate			
Year / Semester	Year 1/ Semester 2 (Spring)			
Teacher's Name	Course Lead: Prof Photos Hajigeorgiou Contributor: Dr Stella Loizou			
ECTS	6	Lectures / week	3	Laboratories / week 2
Course Purpose and Objectives	The main objectives of the course are: <ul style="list-style-type: none"> To give students an introduction to the basic principles of organic chemistry. To cultivate an appreciation of the role of organic chemistry in everyday life and in biological systems. To help develop sound practical skills in the unique laboratory explorations of organic chemistry. 			
Learning Outcomes	The following list provides the learning objectives that will be covered in the lectures , lab practicals and tutorials of each week: <p>Week 1</p> <p>LOBs covered during lectures:</p> <ol style="list-style-type: none"> Identify specific functional groups of organic compounds Categorize organic compounds in particular families Name the first ten straight-chain alkanes Identify common alkyl groups by name and structure Convert Lewis structures to skeletal form, and vice versa Name organic compounds given the structure Draw chemical structure given the name <p>LOB covered during tutorial:</p> <ol style="list-style-type: none"> Solve a wide selection of problems on functional groups and organic nomenclature. <p>Week 2</p>			

LOBs covered during lectures:

9. Recognize and identify the type of isomerism involved
10. Derive, draw, and name structural isomers for alkanes and other organic compounds
11. Draw potential energy diagrams for bond rotation
12. Apply the proper rules of nomenclature for geometric isomers
13. Identify chiral centres in organic molecules
14. Discuss the general principles of optical activity
15. Determine R or S configuration of a chiral centre
16. Identify the relationship between optical isomers

LOB covered during lab practical:

17. Work safely in the organic chemistry laboratory.

Week 3

LOBs covered during lectures:

18. Define what a drug is.
19. List the main routes of drug administration.
20. Describe the main considerations in the drug discovery process.
21. List the steps of the drug development process.
22. Discuss physical properties of alkanes and identify their origin
23. Discuss the chemical reactions of alkanes
24. Identify the different types of strain energy in alkanes and cycloalkanes
25. Discuss the relative stability of cycloalkane conformations
26. Discuss the relative stability of disubstituted cyclohexanes

LOB covered during tutorial:

27. Solve a wide variety of problems on isomers.

Week 4

LOBs covered during lectures:

28. Calculate the degree of unsaturation of organic compounds given the chemical formula
29. Determine the degree of unsaturation of organic compounds given the structure
30. Discuss electrophilic addition reactions to alkenes
31. Identify reagents and products in the principal reactions of alkenes

LOB covered during lab practical:

32. Synthesize a crystalline organic compound and purify it through recrystallization

Week 5

LOBs covered during lectures:

33. Discuss the principal method of preparation of alkynes
34. Identify reagents and products in the reactions of alkynes
35. Describe the free radical addition reactions that form polymers
36. Identify and write the steps of free radical chlorination of alkanes

LOB covered during tutorial:

37. Solve a wide variety of problems on alkanes, cycloalkanes, alkenes, and alkynes.

Week 6

MIDTERM EXAM

LOBs covered during lectures:

38. Write the full mechanism of electrophilic addition of HX to an alkene
39. Write the full mechanisms for SN1 and SN2 reactions
40. Identify which alkyl halides undergo SN1 and SN2 reactions according to structure
41. Identify and discuss the factors involved in facilitating SN1 and SN2 reactions
42. Draw concise and detailed energy reaction diagrams for all reactions considered
43. Discuss the basic principles of organic spectroscopy
44. Interpret infrared absorption spectra of organic compounds

LOB covered during lab practical:

45. Synthesize the common analgesic Aspirin using an esterification reaction.

Week 7

LOBs covered during lectures:

46. Discuss the basic principles of mass spectrometry
47. Identify key spectrometric signals in mass spectra

48. Interpret NMR spectra to determine molecular structure

LOB covered during tutorial:

49. Solve a variety of problems on organic reaction mechanisms.

Week 8

LOBs covered during lectures:

50. Interpret NMR spectra to determine molecular structure

LOB covered during lab practical:

51. Produce soap by reacting a triglyceride (fat) with an alkaline hydroxide solution.

Week 9

LOBs covered during lectures:

52. Describe physical properties of alcohols on the basis of molecular structure

53. Discuss methods of preparation of alcohols

54. List signs and symptoms of paracetamol overdose.

55. Define jaundice.

56. Describe the treatment for paracetamol overdose and explain how the antidote works.

LOB covered during tutorials:

57. Solve a wide variety of problems of organic spectroscopy

Week 10

LOBs covered during lectures:

52. Discuss methods of preparation of alcohols

58. Identify reactants and products of alcohol reactions

59. Describe methods of preparation of aldehydes and ketones

60. Identify reagents and products of a wide variety of aldehyde and ketone reactions

Week 11

LOBs covered during lectures:

61. Discuss the physical properties of carboxylic acids

	<p>62. Discuss the effect of chemical structure on the degree of acidity of carboxylic acids</p> <p>63. Describe methods of preparation of carboxylic acids</p> <p>64. Identify reagents and products in reactions of carboxylic acids</p> <p>65. Describe the physical properties of amines</p> <p>66. Discuss the effect of chemical structure on the degree of basicity of amines</p> <p>67. Explain why amides are not basic</p> <p>68. Identify reagents and products in reactions of amines</p> <p>LOB covered during lab practical:</p> <p>69. Separate a mixture of acetone and water by using fractional and simple distillation and test the effectiveness of the separation.</p> <p>LOB covered during tutorial:</p> <p>70. Solve a variety of problems on alcohols, aldehydes, ketones and carboxylic acids.</p> <p>Week 12</p> <p>LOBs covered during lectures:</p> <p>71. Identify the reagents and products of benzene and benzene-containing compounds</p> <p>72. Discuss substituent effects in substituted benzenes</p> <p>73. Synthesize simple polysubstituted benzene compounds</p> <p>74. Describe detailed syntheses for a wide variety of organic compounds using reactions studied thus far</p> <p>LOB covered during tutorial:</p> <p>75. Solve a wide variety of problems on benzene and aromatic compounds.</p>		
Prerequisites	MED-102 General Chemistry	Required	None
Course Content	<ul style="list-style-type: none"> • Functional Groups • Organic Nomenclature • Isomers • The Art of Drug Development • Alkanes • Cycloalkanes • Alkenes • Alkynes 		

	<ul style="list-style-type: none"> • IR Spectroscopy • Mass Spectrometry • NMR Spectroscopy • Reaction Mechanisms • Alcohols • Paracetamol Overdose – An Interactive Approach to Learning • Aldehydes & Ketones • Carboxylic Acids • Nitrogen Compounds • Benzene • Organic Synthesis <p><u>Laboratory Practicals:</u></p> <ul style="list-style-type: none"> • Laboratory Safety Demonstrations • Synthesis of Dibenzalacetone • Synthesis of Aspirin • Synthesis of Soap • Fractional Distillation and Simple Distillation <p><u>Tutorials:</u></p> <ul style="list-style-type: none"> • Functional groups and organic nomenclature • Isomers • Hydrocarbons • Mechanisms • Spectroscopy • Oxygen containing molecules • Benzene 												
Teaching Methodology	Lectures, Tutorials, Laboratory Practical Sessions.												
Bibliography	<p>Required Textbooks/Reading:</p> <table border="1"> <thead> <tr> <th>Authors</th> <th>Title</th> <th>Edition</th> <th>Publisher</th> <th>Year</th> <th>ISBN</th> </tr> </thead> <tbody> <tr> <td>J. McMurry</td> <td>Organic Chemistry</td> <td>8th Int Edition</td> <td>Thomson-Brooks/Cole</td> <td>2012</td> <td>9780840054531</td> </tr> </tbody> </table>	Authors	Title	Edition	Publisher	Year	ISBN	J. McMurry	Organic Chemistry	8 th Int Edition	Thomson-Brooks/Cole	2012	9780840054531
Authors	Title	Edition	Publisher	Year	ISBN								
J. McMurry	Organic Chemistry	8 th Int Edition	Thomson-Brooks/Cole	2012	9780840054531								

	Recommended Textbooks/Reading:					
	Authors	Title	Edition	Publisher	Year	ISBN
	S. McMurry	Study Guide and Student Solutions Manual for John McMurry's Organic Chemistry	8 th Edition	Brooks/Cole	2012	9780840054555
	T.W.G. Solomons and C.B. Fryhle	Organic Chemistry	11 th Edition	Wiley	2014	9781118323793
Assessment	Laboratory reports (10%), Midterm Exam (30%), and Final Exam (60%). Assessment is by Single Best Answers (SBAs) and Short Answer Questions (SAQs).					
Language	English					