**Course Description Form**

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| 1. Course Name:
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| **Spectral Identification** |
| 1. Course Code:
 |
| **406CHSI** |
| 1. Semester / Year:
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| Year |
| 1. Description Preparation Date:
 |
| 1/10/2024 |
| 1. Available Attendance Forms:
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| Regularity. |
| 1. Number of Credit Hours (Total) / Number of Units (Total)
 |
| 60 hours |
| 1. Course administrator's name (mention all, if more than one name)
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| Name: Safaa Abdulhameed DadooshEmail: safaabdulhameed@uodiyala.edu.iq  |
| 1. Course Objectives
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| **Course Objectives** | Studying the spectroscopic diagnosis of organic compounds and teaching students all the necessary information related to the subject of spectroscopic diagnosis to know the structural structure of organic compounds, which qualifies them to work and research in all fields of spectroscopic diagnosis of organic compounds.* Giving an idea about the structural structure and stereomorphology of organic compounds using nuclear magnetic resonance (NMR) spectroscopy and knowing the main functional groups using infrared spectroscopy, in addition to knowing the wavelengths of organic compounds using ultraviolet radiation.
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| 1. Teaching and Learning Strategies
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| **Strategy** | Power point lecture method using data show and interactive whiteboard.1. - Explanation and clarification.
2. - Providing students with the basics and additional topics related to the outcomes of thinking and chemical spectroscopic diagnosis of organic compounds.
3. - Forming discussion groups during lectures to discuss organic chemistry topics that require thinking and analysis.
4. Asking students a set of thinking questions during lectures, such as what, how, when, and why for specific topics.
5. Giving students homework that requires self-explanation in causal ways.
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| 1. Course Structure
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| **Week** | **Hours** | **Required Learning Outcomes** | **Unit or subject name** | **Learning method** | **Evaluation method** |
| 1 | 2 | An introductory introduction to areas of electromagnetic radiation | Microwave and radio radiation - infrared radiation - visible radiation - ultraviolet radiation - X-rays - cosmic rays | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 2 | 2 | Definition of ultraviolet radiation and its sources | The sun - stars and planets | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 3 | 2 | Addressing Berlamert's law | Equations and derivations | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 4 | 2 | Identify electronic transfers in organic molecules | Synergistic, non-synergistic, and anti-synergistic bonds | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 5 | 2 | Explanation and clarification of the synergistic, non-synergistic, and anti-associative bonds | Synergistic, non-synergistic, and anti-synergistic bonds | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 6 | 2 | Identify the Woodward-Fiser rule to calculate the wavelength of dienes | Calculate the wavelength of dienes | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 7 | 2 | Factors affecting the positions of beams in the UV spectrum | The effect of succession - the effect of steric obstruction - the effect of the solvent | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 8 | 2 | The first month exam |  |  |  |
| 9 | 2 | Solvent irritation at wavelength | Properties of solvents used in UV spectroscopy (polar and nonpolar solvents) | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 10 | 2 | The effect of compensated aggregates on wavelength | Pulling compensated aggregates and pushing compensated aggregates | blackboard + PowerPoint+ data show | Daily exams and homework + monthly |
| 11 | 2 | Identify infrared spectroscopy and its regions |  Far, near and medium infrared | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 12 | 2 | Discussing the types of molecular vibrations | Stretching vibrations and bending vibrations | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 13 | 2 | Factors affecting the vibration of bonds | Bond elasticity - relative mass - hybridization - resonance | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 14 | 2 | Identify the main adsorbents of functional groups of alkanes, alkenes, and alkynes | Saturated and unsaturated hydrocarbons | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 15 | 2 | The second month exam |  |  |  |
| 16 | 2 | Identify the main absorptions of functional groups of alcohols, phenols, amines and aromatic compounds. | Hydroxyl group - amine group - double bond | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 17 | 2 | Factors affecting double joint stretching vibrations | Cascade effect - the effect of ring size | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 18 | 2 | Factors that affect the stretching vibration of the (C=O) group. | The effect of hydrogen bonding - compensation in the carbon atom (α) - the effect of succession - the effect of the ring size | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 19 | 2 | Discuss a number of infrared spectra of different organic compounds | Students participate in discussion and solutions | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 20 | 2 | Examples and solutions for functional groups of various organic compounds | Students participate in discussion and solutions | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 21 | 2 | The origin of the phenomenon of nuclear magnetic resonance | Nuclear magnetic resonance phenomenon | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 22 | 2 | Proton nuclear spin states | Rotation towards the magnetic field and rotation against the direction of the magnetic field | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 23 | 2 | How to obtain an NMR spectrum | NMR spectroscopy | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 24 | 2 | Identify the NMR device and how to process the model | One proton-carbon 13- How to prepare the model | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 25 | 2 | The third month exam |  |  |  |
| 26 | 2 | Study of the effect of blocking and chemical displacement | The effect of blocking and the effect of lifting the block | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 27 | 2 | Chemical displacement and factors affecting their locations | Blocking - electronegativity - pulling groups - driving groups | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 28 | 2 | Solvents used in NMR spectra and their locations | The basic solvents used, their characteristics and locations on the spectrum | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 29 | 2 | Types of nuclear fission in the nuclear magnetic resonance spectrum | Single, binary, triple, quadruple, and five-fold fissions | blackboard + PowerPoint+ data show | Daily exams and homework + monthly exams |
| 30 | 2 | The forth month exam |  |  |  |

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| 1. Course Evaluation
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| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc |
| 1. Learning and Teaching Resources
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| Required textbooks (curricular books, if any) | Spectrometric Identification of Organic Compounds.by Robert M. Silverstein, Francis X.  |
| Main references (sources) | Identification of Organic . Silverstein and Bassler - - Infrared spectroscopy fundamental and application by  Barbara Stuart , 2004  |
| Recommended books and references (scientific journals, reports...) |  |
| Electronic References, Websites | [https://www.wiley.com/en-us/Spectral+and+Chemical+Characterization+of+Organic+Compounds%3A+A+Laboratory+Handbook%2C+3rd+Edition-p-9780471927150](https://www.wiley.com/en-us/Spectral%2Band%2BChemical%2BCharacterization%2Bof%2BOrganic%2BCompounds%3A%2BA%2BLaboratory%2BHandbook%2C%2B3rd%2BEdition-p-9780471927150) <https://www.amazon.in/Stereochemistry-Organic-Compounds-Principles-Applications/dp/0470216395>  |