**Course Description Form**

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| 1. Course Name: | | |
| Instrumental Analysis | | |
| 1. Course Code: | | |
| 405CHIA | | |
| 1. Semester / Year: | | |
| Year | | |
| 1. Description Preparation Date: | | |
| 1-10-2024 | | |
| 1. Available Attendance Forms: | | |
| Regularity. | | |
| 1. Number of Credit Hours (Total) / Number of Units (Total) | | |
| 90 hours-6 unit | | |
| 1. Course administrator's name (mention all, if more than one name) | | |
| Name: Lecturer Sahar Raihan Fadhel saharraihan@uodiyala.edu.iq | | |
| 1. Course Objectives | | |
| **Course Objectives** | Teaching the student the scientific and theoretical concept of the foundations of automated analysis, what are the most important methods used in automated analysis, how to use advanced automated laboratory Instrumentation in completing analysis, the mechanics of the work of these Instrumentation, their most important components, the most important areas of application, and keeping pace with the scientific development of Instrumental Analysis.  Teaching and educating students on all the necessary and necessary information for the subject of instrumental analysis, which qualifies them to work and research in all areas of analytical and research chemistry | |
| 1. Teaching and Learning Strategies | | |
| **Strategy** | | 1. Explanation and Clarification 2. Lecture Method 3. Presentation of Models |
| 1. Course Structure | | |

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| **Week** | **Hours** | **Required Learning Outcomes** | **Unit or subject name** | **Learning method** | **Evaluation method** |
| 1 | 3 | Introduce the student to Definition of electromagnetic radiation | Spectrum regions, the effect of electromagnetic radiation with matter, absorption and emission of radiation by atoms and molecules | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 2 | 3 | Introduce the student to spectroscopic methods | Spectral methods and their types and the interaction of the spectrum with matter | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 3 | 3 | Introducing the student to the methods of analysis by molecular spectra UV- VIS | analysis by Ultraviolet -Visible Spectrophotometry | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 4 | 3 | Introducing the student to the methods of analysis by molecular spectra UV- VIS | Instrumentation used in Spectrophotometry analysis of the ultraviolet and visible region | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 5 | 3 | Introducing the student to the methods of analysis by molecular spectra VIS UV- | The most important applications of molecular Spectrophotometry VIS UV- | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 6 | 3 | Introduce the student to analysis with infrared spectroscopy | Chemical analysis using Infrared spectroscopy | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 7 | 3 | Introduce the student to analysis with infrared spectroscopy | The most important Instrumentation used in spectroscopy using infrared, its components and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 8 | 3 | Introduce the student to the methods of fluorescence and phosphorylation | The phenomenon of fluoridation and phosphorylation and the most important principles and how it occurs | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 9 | 3 | Introduce the student to the methods of scattering and turbidity | Analysis using the phenomenon of light scattering and turbidity and its applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 10 | 3 | Introduce the student to the analysis by atomic absorption spectrophotometry | Analysis using atomic absorption spectrophotometry | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 11 | 3 | Introduce the student to the analysis by atomic absorption spectrophotometry | Atomic absorption Instrumentation and their components and applications of atomic absorption | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 12 | 3 | Introduce the student to the analysis by atomic emission spectroscopy | Analysis using atomic emission spectroscopy | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 13 | 3 | Introduce the student to the analysis by atomic emission spectroscopy | Atomic emission Instrumentation and their components and applications of atomic emission | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 14 | 3 | Introduce the student to analysis by using X-ray technique | X-rays, theoretical foundations, Instrumentation, how to Analysis and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 15 | 3 | Introduce the student to analysis using the CHN technique | CHN technique, theoretical foundations, Instrumentation, how to Analysis and applications |  | Daily exams  Homework  Monthly exams |
| 16 | 3 | first exam |  |  |  |
| 17 | 3 | Introduce the student to Analysis by Electrochemical Methods | Electrochemical Methods and cell types | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 18 | 3 | Introduce the student to Analysis by Electrochemical Methods | Potentiometric measurements, potentiometric titrations and types of electrodes | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 19 | 3 | Introducing the student to the methods of Voltammetry ، Polarography and Amperometric Titrations | Analysis using voltammetry, polarography and Polarography wave techniques and Instrumentation | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 20 | 3 | Introducing the student to the methods of Voltammetry ، Polarography and Amperometric Titrations | Amperometric Titrations and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 21 | 3 | Introduce the student to Electrodeposition and coulometric Methods | Analysis using Electrodeposition and coulometric technique, theoretical foundations, Instrumentation and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 22 | 3 | Introduce the student to Conductometry | Analysis using Conductometry , theoretical foundations, Instrumentation and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 23 | 3 | Introduce the student to the methods of thermal analysis | Thermal analysis methods and their applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 24 | 3 | Introduce the student to the methods of thermal analysis | Thermal analysis and curves | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 25 | 3 | Introduce the students to chromatography techniques | Theoretical foundations of chromatography, types of chromatography and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 26 | 3 | Introducing the student to gas chromatography technique | Theoretical foundations of gas chromatography and how to analysis | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 27 | 3 | Introducing the student to gas chromatography technique | Instrumentation and it's components and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 28 | 3 | Introducing the student to high performance liquid chromatography technology technique | Theoretical foundations of high-performance liquid chromatography and how to analysis | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 29 | 3 | Introducing the student to high performance liquid chromatography technology technique | Instrumentation and it's components and applications | Lecture and discussion | Daily exams  Homework  Monthly exams |
| 30 | 3 | Second Exam |  |  |  |

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| 1. Course Evaluation | |
| 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 | |
| Required textbooks (curricular books, if any) | Principles of Instrumental Analysis , Douglas A. Skoog , James Holler, Stanly R. Crouch,"7th" Edition , 2007. |
| Main references (sources) | 1- Fundamentals of Analytical Chemistry, Douglas A. Skoog and Donald M.West , Eight Edition, 2004.  2- Analytical Chemistry, Gary Christian Sixth Edition  3- Chemical Analysis, Modern Instrumentation Methods and Techniques, Francis Rouessac and  Annick Rouessac Second Edition  4- Modern Analytical Chemistry, David Harvey , Mc Graq Hill Company, 2000. |
| Recommended books and references (scientific journals, reports...) | [www.chemicalprocessing.com](http://www.chemicalprocessing.com) |
| Electronic References, Websites | [www.bytoco.com](http://www.bytoco.com) |