**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the program specification.  |

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| College of EngineeringUniversity of Baghdad | 1. Teaching Institution |
| Environmental Engineering Department | 2. University Department/Centre |
| Analytical Chemistry EnE This course introduce the followings:Laboratory Materials and Reagent, Preparation of Standards Solution, Laboratory Safety, Review of fundamental concepts, How we express Concentration of Solution, Analytical and equilibrium concentrations, Expressions of analytical results, Dilution calculation, Titration principles, Back Titration, Ionic equilibrium in aqueous solutions, pH of solutions, Acid-Base Equilibrium, Gravimetric Analysis and Precipitation Equilibrium, Solubility products, Solubility of gases in Water  | 3. Course title/code and description |
| Environmental Engineering Department | 4. Program (s) to which it contributes |
| Annual System: There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-weeks regular subjects. | 5. Modes of Attendance offered |
| 1st and 2nd / Academic Year 2013-2014 | 6. Semester/Year |
| 60 hrs./ 2 hrs per week | 7. Number of hours tuition (total) |
| February 24th , 2015 | 8. Date of production/revision of this specification  |
| **9. Aims of the Course** |
| The main objectives of the course are: To understand chemistry fundamentals, and to be able to perform calculations with ease. |

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| **10· Learning Outcomes, Teaching ,Learning and Assessment Method**1. **Essential analytical skills required by laboratory technicians, researchers and managers of quality control, production control, research and development and analytical techniques**
2. **Applicable skills to learn calculation of solution concentration, and expression of analytical results**
3. **Learning titration principles**
4. **Learning the principles of redox reactions**
5. **Studying ion equilibrium in aqueous solutions**
6. **Measuring pH of solutions**
7. **Learning acid-base equilibrium**
8. **Analysis of water pollution parameters**
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| ***11. Teaching and Learning Methods***1- Lectures.2- Homework and Assignments.3- Tests and Exams.4- In-Class Questions and Discussions.5- Connection between Theory and Application.6- In- and Out-Class oral conservations. |
| ***12. Assessment Methods***1. Examinations, Tests, and Quizzes.2. Extracurricular Activities.3. Student Engagement during Lectures.4. Responses Obtained from Students, Questionnaire about curriculum and faculty member (Instructor) |

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| ***13. Grading Policy***1. Quizzes: - There will be four quizzes during the academic semester. The quizzes will count 5% of the total course grade.  2. Exams: - There will be three closed books and notes exam during the academic year, The mid-term exam will count 20% of the total course grade. 3. HomeworkThere will be homework after each week and will account 5% of the total course grade7. Final Exam:  - The final exam will be comprehensive, closed books and notes,  The final exam will count 70% of the total course grade.  |

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| **14. Course Structure** |
| **Assessment Method** | **Teaching****Method** | **Unit/Module or Topic Title** | **ILOs** | **Hours** | **Week** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Review of fundamental concepts** | **a, b,**  | **2 (Theo.)**  | **1** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Good lab. practice** | **a, b,**  | **2 (Theo.)** | **2** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Safety in Laboratory** | **a, b, c** | **2 (Theo.)** | **3** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Health and safety in Laboratory** | **a, b, c** | **2 (Theo.)** | **4** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Glassware and Instrument lab.** | **a, b, c** | **2 (Theo.)** | **5** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Stoichiometric calculations****Concentrations of solutions** | **a, b, c,**  | **2 (Theo.)** | **6** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Stoichiometric calculations****Concentrations of solutions** | **a, b, c** | **2 (Theo.)** | **7** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Stoichiometric calculations****Concentrations of solutions** | **a, b, c,e,f, g** | **2 (Theo.)** | **8** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Analytical and equilibrium concentrations, Expressions of analytical results** | **a, b, c, e,f, g** | **2 (Theo.)** | **9** |
| **---------------------** | **-------------** | **Examination** | **--------** | **2 (Theo.)** | **10** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Chemical Equilibrium**  | **a, b, c, g** | **2 (Theo.)** | **11** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Titration principles,****Molarity volumetric calculation**  | **a, b, c,g** | **2 (Theo.)** | **12** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Titration principles,****Molarity volumetric calculation**  | **a, b, c, g** | **2 (Theo.)** | **13** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Titration principles,****Molarity volumetric calculation**  | **a, b, c, d** | **2 (Theo.)** | **14** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Normality calculation** | **a, b, c, d** | **2 (Theo.)** | **15** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Back Titration** | **a, b, c, d** | **2 (Theo.)** | **16** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Acid-Base Equilibrium calculation** | **a, b, c,**  | **2 (Theo.)** | **17** |
| **1 – 4 of article (12)** | **1-6of****article (11)** | **Acid-Base Equilibrium calculation** | **a, b, c** | **2 (Theo.)** | **18** |
| **1 – 4 of article (12)** | **1-6of****article (11)** | **Acid-Base Equilibrium calculation** | **a, b, c,d**  | **2 (Theo.)** | **19** |
| **1 – 4 of article (12)** | **1-6of****article (11)** | **pH pf solution** | **a, b, c, d** | **2 (Theo.)** | 20 |
| **------------** | **--------------** | **Exam.** | **-------** | **2 (Theo.)** | 21 |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Gravimetric analysis and precipitation equilibria** | **h** | **2 (Theo.)** | 22 |
| **1 – 4 of article (12)** | **1-6of****article (11)** | **Gravimetric analysis and precipitation equilibria** | **h** | **2 (Theo.)** | 23 |
| **1 – 4 of article (12)** | **1-16of****article (11)** | **Gravimetric analysis and precipitation equilibria** | **H** | **2 (Theo.)** | 24 |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Precipitation and Titration** | **H** | **2 (Theo.)** | **25** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Precipitation and Titration** | **a, b, c, d, e, f, g, h**  | **2 (Theo.)** | **26** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Redox Reaction** | **a, b, c, d, e, f, g, h** | **2 (Theo.)** | **27** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Redox Reaction** | **a, b, c, d, e, f, g, h**  | **2 (Theo.)** | **28** |
| **1 – 4 of article (12)** | **1-6of****article (11)** | **Solubility Product** | **a, b, c, d, e, f, g, h**  | **2 (Theo.)** | **29** |
| **1 – 4 of article (12)** | **1-6 of****article (11)** | **Solubility of gases in water** | **a, b, c, d, e, f, g, h** | **2 (Theo.)** | **30** |

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| **15. Infrastructure** |
| **Text Book:****1- Gary D. Christian (2006) “Analytical Chemistry”, 5th ed.****.** **References**1. **Simplified procedures for water examination, Awwa M12, manual of water supply practices**
2. **Douglas A. Skoog, Donald M. West, F. James Holler and Stanley R. Crouch , 2001 “Fundamentals of Analytical Chemistry”, eighth edition**
 | **Required reading:****· CORE TEXTS****· COURSE MATERIALS****· OTHER** |
| Available electronic books related to the subject.Extracurricular activities. | Special requirements (include for example workshops, periodicals, IT software, websites) |
|  Lectures. | Community-based facilities(include for example, guestLectures , internship , field studies) |
| 16. Admissions |
| EnE , EnE , EnE , EnE  | Pre-requisites |
| 7 | Minimum number of students |
| 25 | Maximum number of students |
| **Instructor: Assistant Prof. Dr. Jathwa Abdul karime Ibraheem**Environmental Engineering DepartmentCollege of EngineeringUniversity of BaghdadCell phone: 009647702988716E-mail: jathwa58@yahoo.com.  | 17. Course Instructor |