Republic of Iraq

Ministry of Higher Education & Scientific Research Supervision and Scientific Evaluation Directorate Quality Assurance and Academic Accreditation

International Accreditation Dept.

Academic Program Specifications Form For The

Academic Year 2019-2020

Universitiy: Baghdad

College : Engineering

Number Of Departments In The College : 07 seven

Date Of Form Completion : 25/1 / 2021

Dean ’s Name

Date : / /

Signature

Dean ’s Assistant For

Scientific Affairs

Date : / / Signature

The College Quality Assurance

And University Performance

Manager Date : / / Signature

Quality Assurance And University Performance Manager

Date : / / Signature

**TEMPLATE FOR PROGRAMME SPECIFICATIONS**

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

**PROGRAMME SPECIFICATION**

This Programme Specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the provided learning opportunities. It is supported by the specifications for the courses of the programme.

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| 1. Teaching Institution | College of Engineering  University of Baghdad |
| 2. University Department/Centre | Department of Water Resources |
| 3. Programme Title | Water Resources Engineering Program (WRE) |
| 4. Title of Final Awarded degree | B Sc in Water Resources Engineering |
| 5. Modes of Attendance offered | 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-week regular subjects. Each graduating student has to successfully complete 147 credits. Each subject credit is one 50-minute lecture per week or 3 hours of laboratory work per week. which may be used as supplementary material for the class room instruction. Starting from academic year 2019-2019 online lectures have been providing to the students. |
| 6. Accreditation body | ABET |
| 7. Other external influences | The Iraqi Engineers Union |
| 8. Date of production/revision of  this specification | 01-2020 |
| 9. Aims of the Programme.   1. 1. Graduate water resources engineers to serve in water resources sectors, Agriculture, and other related private sectors. 2. 2. Improving the teaching and administrative activities to meet international accreditations standards and the mission of the department. 3. 3. Improving the academic abilities of the faculty and attracting highly skilled personnel. 4. 4. Improving the abilities of management and technical supporting staff and attracting the highly skilled for employment. 5. 5. Optimizing the use of resources and potentials of the department. 6. 6. Cooperating, exchanging academic programs, and participating with other universities and academic centers in developed countries. 7. 7. Establishing viable applied research that generates knowledge for local and foreign users. | |

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| 10. Learning Outcomes, Teaching, Learning and Assessment Methods |
| Following a review of the ABET Criteria and the program objectives, it has been decided by department the Water Resources Engineering that the ABET Criteria (A1 – A4) encompass the spirit of our vision. Therefore, outcomes (A1 – A4) are adopted as the Department POs.  The adopted Department POs are:  **A. Cognitive goals**  A1. An ability to apply knowledge of mathematics, science, and engineering.  A2. An ability to design a system, or components, or process to meet desired needs.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). |
| B. The special skills goals (B1-B4) for the program of the department the Water Resources are :  B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. Perform water resources engineering integrated design of systems, components, or processes by means of practical experiences (group projects).    . |
| Teaching and Learning Assessment methods (before graduation) |
| Lectures ([in-person](https://www.wordwebonline.com/en/INPERSON) and online)  1. Tutorials 2. Homework and assignments 3. Laboratory experiments 4. Tests and examinations 5. In-class questions and discussions 6. Connection between theory and application 7. Field trips 8. Extra-curricular activities 9. Seminars 10. In- and out-class oral conversations   12.Reports, presentations, and posters |
| Programme Assessment methods (after graduation)   * Survey of Alumni * The related committees in the department such as scientific-, student affairs, social committees * Employment trends of our graduates will be tracked, e.g., place of employment and job title, every year * Survey of Employers of Graduates will be given at least every year to determine if the POs are still relevant to the employers of our graduates * The POs themselves will be re-evaluated every few years first by the faculty and then with the Council Presidency Department. Informal review of the POs will occur in conversations with alumni.   C. Affective and value goals  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution to a problem |
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| Teaching and Learning Methods  1-Observations  2-Lectures |
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| Assessment methods  Presentations  Reports |
| Assessment Form  D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a leader or a manager  D4. Ability to communicate effectively with engineers, other professionals and community at large |

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| Teaching and Learning Methods | | | | |
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| Assessment Methods | | | | |
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| 11. Programme Structure | | | | 12. Awards and Credits |
| Level/Year | Course or  Module  Code | Course or Module  Title | Credit rating |
| **1st year** | 101WRAL | Arabic Language | 2 | Bachelor Degree  Requires (x) credits |
| 102WRMA | Mathematics I | 6 |
| 103WRCO | Computer Programming | 4 | **Total Sum 41** |  |
| 104WREM | Engineering Mechanics | 6 |
| 105WRED | Engineering Drawing | 6 |
| 106WRES | Engineering Statistics | 4 |
| 107WRME | Materials Technology | 3 |
| 108WREG | Engineering Geology | 2 |
| 109WEIR | Introduction to Water Resources | 4 |
| 110 WREN | English Language | 2 |
| 111 WRCO | Computer | 2 |
|  | 210WRMA | Mathematics II | 6 |  |
|  | 211WRCO | Computer Programming | 4 |  |
|  | 212WRSM | Strength of Materials | 4 |  |
| **2st year** | 213WRCS | Components of Hydraulic Structures | 2 |  |
|  | 214WRSU | Surveying | 6 |  |
|  | 215WRSP | Soil Physics | 3 | **Total Sum 40** |
|  | 216WRLR | Land Reclamation | 3 |  |
|  | 217WRWM | Water Quality and Treatment | 6 |  |
|  | 218WRDF | Democracy and Freedom | 2 |  |
|  | 219 WREN | English Language | 2 |  |
|  | 220 WRCO | Computer | 2 |  |

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|  | 319WRHY | Hydrology | 4 | **Total Sum 38** |
|  | 320WRSF | Soil Mechanics and Foundation | 7 |
|  | 321WRIP | Irrigation Principles | 4 |
| **3st year** | 322WRID | Irrigation and Drainage Networks | 2 |
|  | 323WRFM | Fluid Mechanics | 7 |
|  | 324WRSA | Structural Analysis | 2 |
|  | 325WRDS | Design of Concrete Structures | 2 |
|  | 326WREA | Engineering Analysis | 3 |
|  | 327WRSC | Soil Conservation | 2 |
|  | 328WRNM | Numerical Methods | 3 |
|  | 329WREN | English Language | 2 |

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|  | 429WRDH | Design of Hydraulic Structures | 6 | **Total Sum 38** |
|  | 430WRDI | Design of On-Farm Irrigation Systems | 4 |
|  | 431WRGW | Ground Water | 2 |
| **4st year** | 432WRDE | Drainage Engineering | 2 |
|  | 433WREP | Engineering Project | 4 |
|  | 434WRPM | Project Management | 4 |
|  | 435WRAS | Analysis of Water Resources Systems | 4 |
|  | 436WRDE | Dam Engineering | 4 |
|  | 437WRAH | Elective Course/ Application in Hydraulics | 2 |
|  | 438WREE | Engineering Economy | 3 |
|  | 439WREC | Elective Course/ Water Quality Management | 3 |
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| 13. Personal Development Planning |
| Continuous improvement is the goal of the Department of Water Resources Engineering. The curriculum of the department has been continuously updated to meet the needs of the field of work. Meetings and discussion are usually held with employers of the graduates of the department in order to get acquainted with their needs and trying to incorporate those needs in the curriculum of the department. The following specific actions have either been successfully implemented or are in process;   1. Comprehensive changes in curriculum. 2. Continuous improvement of faculty through training programs. 3. Promoting a number of faculty members to higher scientific ranks.   4. Purchasing a number of laboratory equipment and measuring instruments.   1. Purchasing a number of books for the library of the department. 2. Purchasing a number of computers. 3. Establishing computer network access by using LAN network of the Center of the University of Baghdad in the form of Wireless terminals available now in the Department. 4. Employing a number of faculty, engineering, and technical staff. 5. Setting up an increase in extra-curricular activities for students such as scientific conferences and seminars.   10.Reconstructing and rehabilitating class rooms and offices in the Department, as  well as services and infrastructure. |
| 14. Admission criteria. |
| An applicant for admission to an undergraduate program of WRE in the Department of Water Resources Engineering – College of Engineering – University of Baghdad must satisfy the following minimum requirements:   1. He / she should have an Iraqi secondary school certificate, or its equivalent, and majored in natural or technological sciences. The students must obtain a high rate qualifies for admission to engineering colleges. 2. Acceptance is centrally controlled by the Ministry of Higher Education and Scientific Research (MOHESR). 3. Application to the Department of Water Resources is made directly through the MOHESR and independently from the application to the college of engineering. The number of students accepted is limited to the number of seats available as decided by the College Council based on the capacity of resources of the Department. The capacity plan of the Department of Water Resources in the last three years was 40 - 60 students. 4. Also included a plan to accept the top students from Technical Institutes Foundation and the outstanding employees from state institutions and ministries. 5. The applicant must submit the required documents within a specified period. 6. An applicant who has graduated from a secondary school system outside Iraq must have completed twelve years of combined primary and secondary school studies from a recognized school. He/she is also required to provide an equivalency certificate from the Iraqi Ministry of Education.   Admission to the Department of Water Resources is highly competitive. As explained above, applicants are granted admission in accordance with an overall evaluation on the basis of their rating record, but only to the extent permitted by the maximum number of new admissions established for that academic year. |
| 15. Key sources of information about the programme |
| 1. Department page in the website of the college. 2. Guide of the Department of Water Resources Engineering. 3. College of Engineering Catalog. 4. Minutes of some Committee meetings of the Department of Water Resources Engineering. 5. Subjects portfolios for Water Resources Engineering subjects. 6. Documentation Committee in the Department. 7. Staff and students of the Department. 8. Examinations Committee in the Department. |

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| Curriculum Skills Map | | | | | | | | | | | | | | | | | | | |
| please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed | | | | | | | | | | | | | | | | | | | |
|  | | | | Programme Learning Outcomes | | | | | | | | | | | | | | | |
| Year / Level | Course  Code | Course  Title | Core (C) Title or Option (O) | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| First | 102 WRMA | Math. | )C) | X |  | X |  |  |  | X |  | X | X | X | X |  | X | X | X |
| 2019/ 1st level | 103 WRCO | Computer Programming | (C) |  | X | X |  | X | X | X |  | X | X | X | X | X | X | X | X |
| 2019/ 1st level | 104 WREM | Engineering Mechanics | (C) | X |  |  |  |  | X | X |  | X |  | X |  |  |  | X |  |
| 2019/ 1st level | 105 WRED | Engineering Drawing | (C) |  |  | X |  | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 1st level | 106 WRES | Engineering Statistics |  | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 1st level | 107WREG | Materials Technology | (C) | X |  | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 1st level | 108 WREG | Engineering Geology | (C) | X |  | X | X | X | X | X |  | X | X | X | X | X |  |  |  |

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| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 1st level | [437](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) WRAH | Applied Hydraulics, | (C) | X |  | X |  |  | X |  |  |  |  | X |  | X | X | X |  |
| 2019/ 1st level | 111 WRCO | Computer | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 1st level | 110WREN | English Language I |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| 2019/ 1st level | 101WRAL | Arabic Language |  |  |  |  |  |  |  |  |  |  |  | X | X | X | X | X | X |
| 2019/ 1st level | 210 WRMA | Mathematics II, | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 2nd level | 211 WRCO | Computer Programming | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 2nd level | 212WESM | Strength of Materials | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

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| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 2nd level | 213 WRCS | Components of Hydraulic Structures | (C) | Х | Х | Х |  |  | Х | Х |  |  | Х | Х |  | Х | Х | Х | Х |
| 2019/ 2nd level | 214 WRSU | Surveying | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 2th level | 215 WRSP | Soil Physics | (C) | X | X | X | X | X | X | X | X | X |  |  | X | X | X | X | X |
| 2019/ 2nd level | 216WRLR | Land reclamation | (C) | Х | Х | Х |  | Х | Х | Х |  | Х | Х |  |  |  | Х |  |  |
| 2019/ 2nd level | 217 WRWM | Water quality and treatment | (C) | Х | Х | Х |  | Х | Х | Х |  | Х | Х |  |  |  | Х |  |  |
| 2019/ 2nd level | 220 WRCO | Computer | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

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| Year / Level | Course  Code | Course  Title | Core (C) Title or Option (O) | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 2nd level | 219WREN | English Language II | (C) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| 2019/ 2nd level | 218WRDF | Democracy and Freedom |  | X | X |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2019/ 3rd level | 319WRHY | Engineering  Hydrology | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 3th level | 320 WRSM | Soil Mechanics and Foundation Design | (C) | X | X | X |  | X | X | X |  | X |  |  | X | X | X | X | X |
| 2019/ 3rd level | 321 WRIE | Irrigation Principles | (C) | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| 2019/ 3rd level | 322 WRID | Irrigation and Drainage Networks |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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|  | | | | Programme Learning Outcomes | | | | | | | | | | | | | | | |
| Year / Level | Course  Code | Course  Title | Core (C) Title or Option (O) | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 3rd level | 323 WRFM | Fluid Mechanics | (C) | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| 2019/ 3rd level | 324 WRSA | Structural Analysis | (C) | X | X |  | X | X | X | X |  | X | X | X |  | X | X | X | X |
| 2019/ 3rd level | 325 WRDC | Design of Concrete Structures | (C) | X | X | X | X | X | X | X |  | X | X | X | X | X |  | X | X |
| 2019/ 3rd level | 326 WREA | Engineering Analysis | (C) | X |  | X | X |  |  | X |  | X | X | X | X | X | X | X | X |
| 2019/ 3rd level | 327WRSC | Soil Conservation | (C) | Х | Х | Х |  | Х | Х | Х |  | Х | Х |  |  |  | Х |  |  |
| 2019/ 3rd level | [328](file:///C:\Users\Me\Desktop\المقرارات%20الدراسية\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) WRNM | Numerical Analysis | (C) | X |  | X |  |  |  | X |  | X | X | X | X | X | X | X | X |

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|  | | | | Programme Learning Outcomes | | | | | | | | | | | | | | | |
| Year / Level | Course  Code | Course  Title | Core (C) Title or Option (O) | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 3rd level | 329 WREN | English Language | (C) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | X |
| 2019/ 4th level | 429WRDH | Design of Hydraulic Structures | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 4th level | 430 WRDI | Design of On- Farm Irrigation Systems | (C) | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |
| 2019/ 4th level | 431 WRGW | Groundwater | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 4th level | 432 WRDE | Drainage Engineering | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 4th level | 434  WRPM | Construction Management | (C) | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2019/ 4th level | [435](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) WRAS | Analysis of Water Resources Systems | (C) | Х | Х | Х |  | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х | Х |

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|  | | | | Programme Learning Outcomes | | | | | | | | | | | | | | | |
| Year / Level | Course  Code | Course  Title | Core (C) Title or Option (O) | Knowledge and understanding | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | |
| A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 | D1 | D2 | D3 | D4 |
| 2019/ 4th level | 436WRDE | Dam Eng. | (C) | X |  | X |  | X |  |  | X | X | X |  |  | X | X |  |  |
| 2019/ 4th level | 437 WRAH | Application in Hydraulics |  | X |  |  |  |  | X |  |  | X |  |  |  |  |  | X |  |
| 2019/ 4th level | 438 WREE | Engineering Economy | (C) | X |  |  | X |  | X | X |  | X | X | X | X |  | X | X | X |
| 2019/ 4th level | 439 WREC | Water Quality | (O) | X | X | X |  | X | X | X |  | X | X |  |  |  | X |  |  |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | Arabic Language |
| **4. Modes of Attendance offered** | Annual system with on campus lectures. The year 2019-2019 is an exception, where online lectures are used due to COVID-19. |
| **5. Semester/Year** | 1st and 2nd semester, 2019-2020 |
| **6. Number of hours tuition (total)** | 2 hours per week, 60 hours per year |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| |  | | --- | | Introducing the Arabic language and its origins  High | | Highlight the most common linguistic mistakes | | Raising the capability to speak and write properly | | Give a glance on the Arabic literature | | Gain communication skills in proper Arabic language | | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals** | |
| **B. The skills goals special to the course.** | |
| **10. Teaching and Learning Methods** | |
| 1. Lectures 2. Discussion meetings 3. Homework 4. Reports | |
| **11. Assessment methods** | |
| Tests, homework, reports | |
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| **C. Affective and value goals**  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution to a problem | |
| **Teaching and Learning Methods** | |
|  | |
| **Assessment methods** | |
| **D. General and rehabilitative transferred skills**  (other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a leader or a manager  D4. Ability to communicate effectively with engineers, other professionals and community at large | |
| Teaching and Learning Methods | |
| **Assessment methods** | |

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| ***13. Course Structure*** | | | | | |
| Assessment  Method | Teaching  Method | Unit/Module or  Topic Title | LOs  ( Article | Hour | Week |
| Test | Lecture | تأريخ اللغة العربية | C4 | 2 |  |
| Test | Lecture | تأريخ اللغة العربية | C4 | 2 |  |
| Test | Lecture | الاغلاط اللغوية | D4 | 2 |  |
| Test | Lecture | الاغلاط اللغوية | D4 | 2 |  |
| Test, Homework | Lecture, Homework | همزة القطع والوصل | C4 | 2 |  |
| Test, Homework | Lecture, Homework | همزة القطع والوصل | C4 | 2 |  |
| Test, Homework | Lecture, Homework | انواع الهمزة، رسم الهمزة | C3 | 2 |  |
| Test, Homework | Lecture, Homework | انواع الهمزة، رسم الهمزة | C3 | 2 |  |
| Test, Homework | Lecture, Homework | الحروف التي تزداد في الكتابة | C3+C4 | 2 |  |
| Test, Homework | Lecture, Homework | الحروف التي تزداد في الكتابة | C3+C4 | 2 |  |
| Test, Homework | Lecture, Homework | علامات الترقيم | C3+C4 | 2 |  |
| Test, Homework | Lecture, Homework | علامات الترقيم | C3+C4 | 2 |  |
| Test, Homework | Lecture, Homework | العدد | C3+C4 | 2 |  |
| Test, Homework | Lecture, Homework | العدد | C3+C4 | 2 |  |
| Report | Lecture, Report | المبتدأ والخبر | D4 | 2 |  |

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| **14. Infrastructure** | |
| 1. Books Required reading: | **Textbook**  NA |
| 2. Main references (sources) | **References**  الاخطاء اللغوية الشائعة، محمود عبد الرزاق  الاملاء الواضح، عبد المجيد النعيمي  كتاب النحو الواضح في قواعد اللغة العربية، علي الجارم و مصطفى امين |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **15. The development of the curriculum plan** | |
| University requirement, subject to changes from university and ministry. The lecturer has the authority to adopt different references and change the depth of the subject according to the program requirements. | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Calculus I , 102 WRMA.** |
| **4. Modes of Attendance offered** | 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. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 120 hours / 4 hours per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. develop their mathematical knowledge and oral, written and practical skills in a way which encourages confidence and provides satisfaction and enjoyment; 2. read mathematics, and write and talk about the subject in a variety of ways; 3. develop a feel for number, carry out calculations and understand the significance of the results obtained; 4. apply mathematics in everyday situations and develop an understanding of the part which mathematics plays in the world around them; 5. solve problems, present the solutions clearly, check and interpret the results; 6. develop an understanding of mathematical principles; 7. recognise when and how a situation may be represented mathematically, identify and interpret relevant factors and, where necessary, select an appropriate mathematical method to solve the problem; 8. use mathematics as a means of communication with emphasis on the use of clear expression; 9. develop an ability to apply mathematics in other subjects, particularly science and technology; 10. develop the abilities to reason logically, to classify, to generalise and to prove; 11. appreciate patterns and relationships in mathematics; 12. produce and appreciate imaginative and creative work arising from mathematical ideas; 13. develop their mathematical abilities by considering problems and conducting individual and co-operative enquiry and experiment, including extended pieces of work of a practical and investigative kind; 14. appreciate the interdependence of different branches of mathematics; 15. acquire a foundation appropriate to their further study of mathematics and of other disciplines. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of water resources engineering will be able to:   1. To define and understand functions and how to graph these functions. 2. To define and understand the trigonometric functions and how to graph these functions. 3. To have the ability for dealing with limits and how to check the continuity of the functions. 4. To determine the slope of a curve at a point and the rate of at which the function is changed. 5. To know how to find the derivative of the functions and then using this derivative to find the extreme values of the functions. 6. To be able to use the fundamental theorem of calculus to evaluate definite integral and calculate the areas, volumes, lengths of plane curves. 7. To learn how to define, understand, graph and derive the transcendental functions. 8. To be able to specify and apply the integral methods. | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context. | |
| **B. The skills goals special to the course.**  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures 2. Tutorials 3. Home works 4. Test and exams 5. In class questions and discussions 6. Connection between theory and applications | |
| **Assessment methods** | |
| 1. Examinations, Tests and Quizzes 2. Extracurricular activities 3. Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| * Lectures * Tutorials * Home works * Test and exams * In class questions and discussions * Lectures * Tutorials * Home works * Test and exams * In class questions and discussions | |
| **Assessment methods** | |
| * Examinations, Tests and Quizzes * Extracurricular activities * Student engagement during lectures | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| ***10. Course Structure*** | | | | | |
| Assessment method | Assessment method | Assessment method | Assessment method | Assessment method | Assessment method |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
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| (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 | (1-4) of article 12 |
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| **11. Infrastructure** | |
| 1. Books Required reading: | Textbook  George B. Thomas , Maurice D, Weir and Joil R. Hass (2020). “Thomas, Calculus” Twelfth Edition, |
| 2. Main references (sources) | * Calculus: ( Ross L. Finney and George B. Thomas , 1989) * Thomas’ Calculus: (George B. Thomas, Maurice D. Weir and Joel R. Hass , 2011, 12th Edition) * Lectures notes of Prof. Dr. Safa N. Hameed. |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Computer Programming, 103**  **WRCO** |
| **4. Modes of Attendance offered** | Visual Basic is a Microsoft Windows Programming language, and Visual Basic is an example of a graphical-based language. A graphical-based language allows the user to work directly with graphics, Window interfaces concerned with the program, and recent scientific articles from the computer languages ​​ related to the students' specialty. Programming skills are developed during this course. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week, 2 theoretical and 2 tutorial |
| **7. Date of production/revision of this specification** | 2019 |
| **8. Aims of the Course** | |
| The aims of this course are to develop skilled Visual Basic and programming users with the technical background, knowledge, and adaptability to develop well-designed, robust, computer-based solutions to a range of problems. The course introduces students to Microsoft visual basic and Programming. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   * Students list the visual programming concepts. * Explain basic concepts and definitions. * Express constants and arithmetic operations. * Distinguish variable and data types. * Students code visual programs by using Visual Basic work environment. * Distinguish and compose events and methods. * Recognize and arrange control structures. * Design a complete program using visual programming concepts. * Students prepare various projects by helping visual programming. * Prepare project in visual programming. * Manage and analyse prepared project with programs. * Interpret and report obtaining results.   **Goal: At the completion of the Visual Basic Computer Skill training, students will have successfully completed the checklist below.** | |
| 1. **Cognitive goals**   A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Introduction to Visual Basic Programming | 4 |  | 1 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Basic Concepts and Definitions | 4 |  | 2 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Constants and Arithmetic Operations | 4 |  | 3 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Expressions (Expressions): constants (constant), variables (variables), transactions (operators) | 4 |  | 4 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Orders of input and output (Input and Output commands) | 4 |  | 5 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use design windows | 4 |  | 6 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Events and event procedures | 4 |  | 7 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use methods and events | 4 |  | 8 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use the design window to calculations | 4 |  | 9 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use the design window to calculations | 4 |  | 10 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Properties | 4 |  | 11 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Control sturctures | 4 |  | 12 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Loops | 4 |  | 13 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use Statement  for….next | 4 |  | 14 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use Statement  for….next | 4 |  | 15 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use Statement  Select case | 4 |  | 16 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use Statement  Do….While | 4 |  | 17 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Use Statement  Do….While | 4 |  | 18 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Sub procedures | 4 |  | 19 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Sub routines | 4 |  | 20 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Function (function) | 4 |  | 21 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Data structures | 4 |  | 22 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Graphics with Visual Basic | 4 |  | 23 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Graphics with Visual Basic | 4 |  | 23 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Graphics with Visual Basic | 4 |  | 24 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing commands (plotting) | 4 |  | 25 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing commands (plotting) | 4 |  | 26 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing commands (plotting) | 4 |  | 27 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing functions (plotting function) and ( drawing tools figure tools) | 4 |  | 28 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing functions (plotting function) and ( drawing tools figure tools) | 4 |  | 29 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Drawing functions (plotting function) and ( drawing tools figure tools) | 4 |  | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | There is no required textbook to purchase. Readings will be assigned via various sources, such as internet articles, and freely available downloadable textbooks   1. Course Notes for: Learn Visual Basic 6.0 2. Visual Basic 6.0 Dr. Nisreen S. Mohammed 3. [WWW.Youtube.com](http://www.youtube.com) |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). | Programming in Visual Basic 6.0 |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Engineering Mechanics / 104 WREM** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures are provided to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 120 hr., 4 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering. This capacity requires more than a mere knowledge of the physical and mathematical principles of mechanics.   2-Increase the ability to visualize configurations in terms of real materials, actual constraints and the practical limitations which govern the behavior of mechanics and structures.  3- Help the student to develop his ability to visualize which is so vital to problem formulation.  4- Achieve maximum progress when the principles and their limitations are learned together within the context of engineering applications.  5-To build up a strong background knowledge for the next engineering courses such as fluid mechanics, strength of materials, structural analysis etc… | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of water resources engineering will be able to:  1- Determine the resultant of the system of forces exerted on the rigid body in the form of vector or scalar and transform them into equivalent force couple system.  2. Use equilibrium equations to determine the external reactions of statically determinate structures.  3. Find the internal forces and their types in the members of statically determinate truss by both joint method and section method.  4. Determine the centroids of line, area, and volume.  5. Calculate the moment of inertia of area of any shape and can transfer it to any axis.  6. Describe the motion of particle at any moment (displacement, velocity and acceleration) that is moving on linear or curvilinear path. The motion of projectiles can also be solved.  7. Resolve the motion of particle by rectangular, tangential-transverse and polar coordinates, respectively.  8. Analyze the relative motion of bodies (displacement, velocity, and acceleration).  9. Calculate centroid, area moment of inertia of various figures.  10. Calculate various types of forces (external, internal, and friction force) which are exerted on the moving bodies by using second Newton's law.  11. Use work and equations to determine velocity, displacement, and applied force. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering. | |
| **B. The skills goals special to the course.**  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1- Lectures  2- Tutorials  3- Homework and Assignments  4- Tests and Exams  5- In-Class Questions and Discussions  6- Connection between Theory and Application  7- Extracurricular Activities  8- Seminars  9- In- and Out-Class oral conservations | |
| **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 ) | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C3. Enhancing self-learning ability. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D3. Ability to demonstrate the characteristics of a team leader or a manager. | |

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| 10 .Course Structure | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LOs**  **( Article**  **10 )** | **Hours** | **Weeks** |
| 1 – 4 of article (12) | 1-9 of  article (11) | Introduction to statics , basic concepts , scalar and vectors , units | 1 | 4  3 the.  1 tut. | 1 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Force system and components (2-D) | 2 | 4  3 the.  1 tut | 2 |
| 1 – 4 of article (12) | 1-9 of  article (11) | [Rectangular components of a force](http://www.mathalino.com/reviewer/engineering-mechanics/components-of-a-force) | 3 | 4  3 the.  1 tut | 3 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Moment and couple (2-D) | 4 | 4  3 the.  1 tut | 4 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Resultants (2-D) | 5 | 4  3 the.  1 tut | 5 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Types of supports | 6 | 4  3 the.  1 tut | 6 |
| 1 – 4 of article (12) | 1-9 of  article (11) | System isolation and the free body diagram | 7 | 4  3 the.  1 tut | 7 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Types of loads and beams | 8 | 4  3 the.  1 tut | 8 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Equilibrium , conditions and equations of equilibrium | 9 | 4  3 the.  1 tut | 9 |
| 1 – 4 of article (12) | 1-9 of  article (11) | [Equilibrium of collinear , concurrent , [parallel](http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-parallel-force-system) , [and non-concurrent force system](http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-non-concurrent-force-system)](http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-force-system) | 10 | 4  3 the.  1 tut | 10 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Analysis of simple trusses: Method of Joints | 11 | 4  3 the.  1 tut | 11 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Analysis of simple trusses: Method of Sections | 12 | 4  3 the.  1 tut | 12 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Centroid and moment of areas | 13 | 4  3 the.  1 tut | 13 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Centroids of areas by integration | 14 | 4  3 the.  1 tut | 14 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Centroids of Composite areas | 15 | 4  3 the.  1 tut | 15 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Moment of Inertia by integration | 16 | 4  3 the.  1 tut | 16 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Radius of Gyration | 17 | 4  3 the.  1 tut | 17 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Moment of Inertia for Composite areas | 18 | 4  3 the.  1 tut | 18 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Friction, Types of Friction | 19 | 4  3 the.  1 tut | 19 |
| 1 – 4 of article (12) | 11-9 of  article (11) | Dry friction | 20 | 4  3 the.  1 tut | 20 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Static Friction and Kinetic Friction | 21 | 4  3 the.  1 tut | 21 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Introduction to [Dynamics](http://www.mathalino.com/reviewer/engineering-mechanics/dynamics), Newton’s Laws, Units, Gravitation | 22 | 4  3 the.  1 tut | 22 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinematics: Rectilinear Motion with constant acceleration | 23 | 4  3 the.  1 tut | 23 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinematics: Rectilinear Motion with variable acceleration | 24 | 4  3 the.  1 tut | 24 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinematics: Curvilinear Motion | 25 | 4  3 the.  1 tut | 25 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinematics: Projectiles Motion | 26 | 4  3 the.  1 tut | 26 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinetic: Newton’s 2nd Law of Motion | 27 | 4  3 the.  1 tut | 27 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Kinetic: Rectilinear Motion | 28 | 4  3 the.  1 tut | 28 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Introduction to Work and Energy | 29 | 4  3 the.  1 tut | 29 |
| 1 – 4 of article (12) | 1-9 of  article (11) | Work and Energy of Rectilinear Motion | 30 | 4  3 the.  1 tut | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1-" Engineering Mechanics " Statics and Dynamics, R. C. Hibbeler, 11th edition, 2006. |
| 2. Main references (sources) | **References**  1."Engineering Mechanics" Statics, Meriam, J.L. & Kraig, L.G, V1, 5th edition, SI, 2009.  2."Engineering Mechanics" Dynamics, Meriam, J.L. & Kraig, L.G, V1, 5th edition, SI, 2009.  3-"A Textbook of Engineering Mechanics”, R. S. Khurmi, 20th edition, 2000.  ***Others***   1. Notebook prepared by the instructor of the   course   1. Collection of sheets of solved and unsolved   problems and Exams questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| Review the coarse syllabus after two years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | Engineering Drawing , 105 WRED |
| **4. Modes of Attendance offered** | 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-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
|  | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures. 2. Sketching engineering objects in the freehand mode. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1. Examination, tests, and quizzes 2. Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| Drawing and Discussion with students | |
| **Assessment methods** | |
| Presenting the portrait of drawing in assigned appointment | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| ***10. Course Structure*** | | | | | |
| Assessment Method | Teaching Method | Unit/Module or Topic Title | LOs (Article 10) | Hours | Week |
| **/** | **/** | For 1st Year ; The 1st semester starts in November | / | / | 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | General Introduction about Engineering Drawing and Lines. | 1 | 3 | 6 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Lettering | 2 | 3 | 7 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Graphic instruments and their use. | 3 | 3 | 8 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | The alphabet of lines | 4 | 3 | 9 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Exercises for the T-square, triangles and scale. Circles and Tangents | 3 & 4 | 3 | 10 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Combinations (arcs and circles) | 5 | 3 | 11 |
| 3 | 12 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Dimensions, notes, limits and precision. | 6 | 3 | 13 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | The Ellipse | 7 | 3 | 14 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Orthographic Drawing and Sketching (Projection) | 8 | 3 | 15 |
| 3 | 16 |
| 3 | 17 |
| 3 | 18 |
| 3 | 19 |
| 3 | 20 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Pictorial Drawing and sketching (isometric) | 9 | 3 | 21 |
| 3 | 22 |
| 3 | 23 |
| 3 | 24 |
| 5 | 25 |
| 3 | 26 |
| 1 – 2 of  Article (12) | 1 – 5 of  Article (11) | Sectional views and Conventions | 10 | 3 | 27 |
| 3 | 28 |
| 3 | 29 |
| 3 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Engineering Drawing and Graphic Technology “By Thomas E. French & Charles J. Vierck” |
| 2. Main references (sources) | * / the Fundamentals of Engineering Drawing and Graphic Technology: ( Thomas E. French and Charles J. vierck) * Technical Graphics Communication :( Gary R. Bertoline and Eric N. Wiebe ) * Engineering Graphics “Text and Workbook”: ( Jerry W. Craig and Orval B. Craig) * (الرسم الهندسي: ( عبد الرسول الخفاف |
| A- Recommended books and references scientific journals, reports…). | محاضرات باللغة العربية إعداد المدرس : ولاء رفعت – قسم هندسة الموارد المائية |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Engineering Statistics,** [**106WRES**](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) |
| **4. Modes of Attendance offered** | Annual System: They attendance in electronic mode is 2 hours a week. |
| **5. Semester/Year** | Annual |
| **6. Number of hours tuition (total)** | 90 hr., 2 hr per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The main objectives of the course are:  1. To understand statistics fundamentals,  2. To understand the principles, data variation and analysis.  3. To perform analysis and calculations with ease. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. Essential analytical techniques and skills in calculation of statistical problems, and data analysis results.  A2. Studying the extent of data homogeneity.  A3. Measuring the coefficient of variations of several number of sub grouped data.  A4. Learning different statistical measures.  A5. Learning different statistical distributions for the society.  A6. Attract and welcome undergraduate students to our Bachelor of Science program in Water Resources Engineering, and to graduate B.S. students who are innovative problem solvers, who become leaders in their organizations, and who possess the knowledge and skills required for a wide range of careers and career changes. | |
| **B. The skills goals special to the course.**  **B1.**  Essential analytical techniques and skills in calculation of statistical parameters to yield convenient results**.**  **B2.** Concentrating on scientific research and its leading role in helping to serve the society and solving its problems through conducting application researches | |
| **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. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about curriculum and faculty member (Instructor)***.***  4***.*** Home work related to problem solving. | |
| **C. Affective and value goals**  C1.Applicable skills to learn calculation of statistical data analysis.  C2. Mean and variance calculations.  C3. Research and analytical techniques**.**  C4. Prepare students for successful careers in Water Resources Engineering. | |
| **Teaching and Learning Methods** | |
| Intensive studies of regulations | |
| **Assessment methods** | |
| Case studies | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. Become more effective, independent and confident self-directed learners  D2. Improve their general skills for study and career management  D3. Articulate personal goals and evaluate progress towards their achievement  D4. An ability to identify, formulate, and solve engineering problems. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Review of fundamental concepts | 1&2 | 2 (Theo.) | 1 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Data Representation | 1 &2 | 2 (Theo.) | 2 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Measures of central tendency calculations | 1 &2 | 2 (Theo.) | 3 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Measures of dispersion calculations | 1 &2 | 2 (Theo.) | 4 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Construction of histogram and % OGIVE | 1 &2 | 2 (Theo.) | 5 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Binomial Distribution | 1,2,&3 | 2 (Theo.) | 6 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Poisson Distribution  With solved problems | 1,2,&3 | 2 (Theo.) | 7 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Binomial Distribution  With solved problems | 2,3 &4 | 2 (Theo.) | 8 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Normal Distribution  With solved problems | 2,3 &4 | 2 (Theo.) | 9 |
| ------------- | Electronic | t- Distribution | -------- | 2 (Theo.) | 10 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Hypotheses Tests | 2,3 &4 | 2 (Theo.) | 11 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Null Hypothesis | 2,3 &4 | 2 (Theo.) | 12 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | F- Distribution | 2,3 &4 | 2 (Theo.) | 13 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Estimation of Mean and Variance limits | 2,3 &4 | 2 (Theo.) | 14 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Correlation Coefficients | 2,3 &4 | 2 (Theo.) | 15 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | The chi- square Test | 2,3 &4 | 2 (Theo.) | 16 |
| Questions during the lectures ,quiz, exam, present in the class | Electronic | Simple Regression | 2,3 &4 | 2 (Theo.) | 17 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Murray Spiegel , “Statistics”, eighth edition, 2001, Raensellor Polytechnique Institute, Shaumes outline series, USA.   Adam and Bashforth, “ Engineering Statistics", N.Y, 2003 |
| 2. Main references (sources) | * Murray D. Spiegel (2014) “Statisics”, 7th ed. |
| A- Recommended books and references scientific journals, reports…). | Any textbooks regarding Engineering Statistics particularly the ones that deal with applied statistics |
| B-Electronic references, Internet  sites… | <https://www.wiley.com/en-gu/Statistics+for+Engineers:+An+Introduction-p-9780470745564>  http://www.fulviofrisone.com/attachments/article/447/Schaum's%20Outline%20of%20Statistic.pdf |
| **12. The development of the curriculum plan** | |
| Not to relay on traditional examinations but the creation of reports following the reading of textbooks. These reports are validated and transformed into academic credits for graduation purposes. | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Materials technology, 107 WRME** |
| **4. Modes of Attendance offered** | One Semester 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 semester is composed of 15 weeks regular subjects.  Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 2nd semester, 2019-2020 |
| **6. Number of hours tuition (total)** | 60 hours / 4 hours per week, 2 hr. theoretical and 2 hrs. laboratory work per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. This course appraises the characteristics, properties, applications and behaviour (including strengthening mechanisms) during processing, fabrication, and service of a wide range of engineering materials. 2. Evaluate the effects of stress, fatigue, creep, corrosion, and wear on material. 3. Examine forms and effects of corrosion in metals and review the main methods of corrosion prevention. 4. Systematically apply and justify procedures used in the failure analysis of a Component. 5. Systematically specify and justify suitable material(s) for a given application, and including the use of relevant material selection methodologies. 6. Connection between theory and applications | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Introduction to Materials Technology. 2. The engineering properties of Aggregate and types of aggregate. 3. Types and engineering properties of Bricks including internet sources. 4. The mechanics of Construction with brick and types of bond. 5. The engineering aspects of the Mortar and its types such as cement and Lime. 6. Introduces the description of Concrete tests and properties of concrete, and their field and laboratory test such as compressive strength and modulus of elasticity. 7. Develop a successful theoretical reasoning and critical thinking from the output of Materials Technology. 8. Introduce the definition, name of Additive and admixtures and their usage. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures notes 2. Tutorials 3. Homework and Assignments 4. Laboratory Experiments 5. Test and Exams, Reports and Presentations. 6. In class questions and discussions 7. Online lectures have been providing to the students using Google Classroom Application. 8. Discussion with students | |
| **Assessment methods** | |
| * 1. In-class and online tests, and quizzes.   2. Student engagement during lectures   3. Two Monthly written exams and one Laboratory Exam. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| Lectures notes  Tutorials  Online lectures have been providing to the students using Google Classroom Application.  Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| ***10. Course Structure*** | | | | | |
| **Assessment Method** | **Teaching Method** | **Unit model or Topic title** | **LO’s**  **Article 10** | **Hours** | **Week** |
| 1 to 3 of article 12 | 1 to 8 of article 11 | Introduction in Material Technology | 1and 2 | 2 theo  2 Lab. | 16 |
| Introduction in Material Technology | 1and 2 | 2 theo  2 Lab. | 17 |
| Bricks | 3 | 2 theo  2 Lab. | 18 |
| Types of Brick | 3 | 2 theo  2 Lab. | 19 |
| Brick works | 4 | 2 theo  2 Lab. | 20 |
| Types of bond | 4 | 2 theo  2 Lab. | 21 |
| Mortar and its types | 4 | 2 theo  2 Lab. | 22 |
| Concrete | 5 | 2 theo  2 Lab. | 23 |
| Concrete works | 5 | 2 theo  2 Lab. | 24 |
| Cement | 5 | 2 theo  2 Lab. | 25 |
| Aggregates | 5 | 2 theo  2 Lab. | 26 |
| Admixtures | 8 | 2 theo  2 Lab. | 27 |
| Lime | 5 | 2 theo  2 Lab. | 28 |
| Properties of concrete | 6 | 2 theo  2 Lab. | 29 |
| Properties of concrete | 6 | 2 theo  2 Lab. | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Artin Livon and Zuhair Saako, 1977. “Building Construction” University of Mousul-Iraq. (Arabic Reference) |
| 2. Main references (sources) | * Artin Livon and Zuhair Saako, 1977. “Building Construction” University of Mousul-Iraq. (Arabic Reference)Internet sites. * Internet sites |
| A- Recommended books and references scientific journals, reports…). | 1- Lectures and solved illustrative problems  2-On-line resources |
| B-Electronic references, Internet  sites… | On-line resources |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Engineering Geology, 108 WREG** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. One hour theoretical and 2 hours of laboratory work per week.  Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hours, 1 hr. theoretical and 2 hrs. laboratory work per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Teaching Principles of Engineering Geology. 2. The course introduces basic definitions of minerals, rocks, materials, rock mechanics, and surface erosion control, Soil, ground water and mass movement dams and reservoirs and their geotechnical considerations. 3. Introduces the description of rocks, and their field and laboratory test such as compressive strength and modulus of elasticity. 4. Develop a successful theoretical reasoning and critical thinking from the output of Engineering Geology. 5. Provides and encourages students to understand that practically impossible to have a successful design of hydraulic structures without the use of engineering mechanics, engineering geology and strength of materials etc. 6. Introduce Rivers and Stream Geology. 7. Taught the student the Water Bearing Qualities of Rocks and Types of Aquifers. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Introduction to Engineering Geology and Geological Engineering. 2. The engineering properties of rocks including lab tests. 3. Types of aquifers and the motion of groundwater through different aquifers including internet sources. 4. The engineering properties of soils including internet sources. 5. The mechanics of Mass Movement including internet sources. 6. The geo-engineering aspects of the reservoirs and dam construction including internet sources. 7. Introduces the description of rocks, and their field and laboratory test such as compressive strength and modulus of elasticity. 8. Develop a successful theoretical reasoning and critical thinking from the output of Engineering Geology. 9. Provides and encourages students to understand that practically impossible to have a successful design of hydraulic structures without the use of engineering mechanics, engineering geology and strength of materials etc. 10. Introduce Rivers and Stream Geology. 11. Taught the student the Water Bearing Qualities of Rocks and Types of Aquifers. 12. Taught the student the Mass movements, Faults, Folds and Sliding. 13. Introduce the Dams and reservoirs and their geotechnical considerations in site selection. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1. Lecture notes 2. Tutorials 3. Homework and Assignments 4. Tests and Exams 5. In-Class Questions and Discussions 6. Wooden samples of rocks planes. 7. Online lectures have been providing to the students using Google Classroom Application. | |
| **Assessment methods** | |
| 1-In-clss and online tests, and quizzes.  2-Student engagement during lectures  3-Two Monthly written exams. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| * lectures, * tutorials, and * supervised team work. | |
| **Assessment methods** | |
| Discussion with students | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-2 | 1-2 | Lab induction and Eng. geology | 1-2 | 3  1 theo  2 lab | 1 |
| 1-3 | 1-7 | Engineering Properties and Classification of Soil | 1-4 | 3  1 theo  2 lab | 2 |
| 1-3 | 1-7 | Engineering Properties and Classification of Soil | 1-4 | 3  1 theo  2 lab | 3 |
| 1-3 | 1-7 | Engineering Properties and Classification of Soil | 1-4 | 3  1 theo  2 lab | 4 |
| 1-3 | 1-7 | Engineering Properties of Rocks | 1-7 | 3  1 theo  2 lab | 5 |
| 1-3 | 1-7 | Engineering Properties of Rocks | 1-7 | 3  1 theo  2 lab | 6 |
| 1-3 | 1-7 | Engineering Properties of Rocks | 1-7 | 3  1 theo  2 lab | 7 |
| 1-3 | 1-7 | Classification of Rocks | 1-9 | 3  1 theo  2 lab | 8 |
| 1-3 | 1-7 | Classification of Rocks | 1-9 | 3  1 theo  2 lab | 9 |
| 1-3 | 1-7 | Groundwater and Geology | 1-13 | 3  1 theo  2 lab | 10 |
| 1-3 | 1-7 | Groundwater and Geology | 1-13 | 3  1 theo  2 lab | 11 |
| 1-3 | 1-7 | Zonal Distribution of Ground water,  Ground Water Movement. | 1-13 | 3  1 theo  2 lab | 12 |
| 1-3 | 1-7 | Zonal Distribution of Ground water,  Ground Water Movement. | 1-13 | 3  1 theo  2 lab | 13 |
| 1-3 | 1-7 | Mechanics of Mass Movement | 1-13 | 3  1 theo  2 lab | 14 |
| 1-3 | 1-7 | Dams and Reservoirs | 1-13 | 3  1 theo  2 lab | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Engineering Geology: Principles and Practice, By David George Price (2009) |
| 2. Main references (sources) | * Foundations of Engineering Geology, 3rd Edition by Tony Waltham. * Physical Geology, 13th Edition by Charles C. Plummer, Diane H. Carlson and Lisa Hammersley, McGraw-Hill. * Principles of Geology: ( Gilluly J. , A. C. Waters and A. O. Woodford, 3rd Edition ) |
| A- Recommended books and references scientific journals, reports…). | Water Resources Systems: modeling techniques and analysis |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Introduction to Water Resources Engineering / 109 WRIR** |
| **4. Modes of Attendance offered** | 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-week regular subject. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The main goal of this course to learn the student that water is one of the most precious and a finite resources that is essential for agriculture, industry and human existence and the life in Iraq since eternity depends on the waters of its two great rivers: The Tigris and the Euphrates but its geographical location being the lower riparian state, is placing it in an embarrassing situation because it is negatively affected by the multi-purpose Turkish project constructed or planned to be constructed without a prior consultation with Iraq. Therefore, this course is designed to alert Students to the problem of water shortage in Iraq and how to save them and to conserve while providing necessary quantities as well as conserve the environment | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | |
| **Teaching and Learning Methods** | |
| 1. Lectures  2. Tutorials  3. Homework and Assignments  4. Tests and Exams  6. In-Class Questions and Discussions  7. Connection between Theory and Application | |
| **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). | |
| **C. Affective and value goals**  C3. Ability to function effectively as an individual in a group. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager. | |

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| **10. Course Structure** | | | | | |
| Assessment  Method | Teaching  Method | Unit/Module or  Topic Title | Los  ( Article  10 ) | Hours | Week |
| 1-3 of article(12) | 1-7 of article(11) | Water resources: hydrologic cycle ,Sources |  | 2 theo. | 1 |
| = | = | Field of Weatr Resource |  | = | 2 |
| = | = | Water Resources in Iraq: Sources |  | = | 3 |
| = | = | Water Resources in Iraq: Sources |  | = | 4 |
| = | = | Iraqi water policy to conserve the water resources |  | = | 5 |
| = | = | Irrigation: sources, soil -water relationship |  | = | 6 |
| = | = | Water quality |  | = | 7 |
| = | = | Irrigation methods |  | = | 8 |
| = | = | Drainage: sources of excess water |  | = | 9 |
| = | = | Drainage and Irrigation net work |  | = | 10 |
| = | = | Drainage and Irrigation net work structure |  | = | 11 |
| = | = | Ground water: occurrence, ground water hydraulic |  | = | 12 |
| = | = | Flood control: method of flood control |  | = | 13 |
| = | = | Types of reservoirs |  | = | 14 |
| = | = | Types of dams |  | = | 15 |
| = | = | Types of spillways |  | = | 16 |
| = | = | Water Resources project in Iraq: Dams |  | = | 17 |
| = | = | Reservoirs |  | = | 18 |
| = | = | Barrage |  | = | 19 |
| = | = | Irrigation and Reclamation Projects |  | = | 20 |
| = | = | Outfall Drain |  | = | 21 |
| = | = | Water Consumer Sector: Agriculture sector, Industry sector |  | = | 22 |
| = | = | Hydropower, water supply and municipal |  | = | 23 |
| = | = | Hydropower: introduction |  | = | 24 |
| = | = | Method of electrical generation, hydropower station in Iraq |  | = | 25 |
| = | = | Laws on the use of Shared Water Resources |  | = | 26 |
| = | = | , the apportionment of the Tigris and Euphrates |  | = | 27 |
| = | = | Each student will write a major research paper on some water resources issue and each student will also present his/her research to the class during the last few weeks of the semester |  | = | 28 |
| = | = | Each student will write a major research paper on some water resources issue and each student will also present his/her research to the class during the last few weeks of the semester |  | = | 29 |
| = | = | Each student will write a major research paper on some water resources issue and each student will also present his/her research to the class during the last few weeks of the semester |  | = | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | References   1. Encyclopedia of Iraq’s Irrigation services by Ministry of Water Resources 2. .Irrigation & Drainage by Charle Shukri 3. Study of Laws, international and regional conventions to regulate the use of water resources by AOAD -   4- Irrigation &Drainage in Iraq by Najib Karofa |
| 2. Main references (sources) | Others  1-Notebook prepared by the instructor of the course  2-Magazin Tender Rafidain by ministry of Water Resources |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **English language, 110WREN** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures are provided to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 12 hr., 1 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to empower students with the language and life skills they need to carry out their goals. To this end it provides ample opportunities for students to build awareness and practice language in real- life scenarios. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  By the end of this communication skills course, the students will be able to:  1- Find and understand information about vocabulary, pronunciation, usage, and grammar in reference texts, online resources, and English language dictionaries.  2- Develop conversational English skills necessary for becoming a contributing participant in small group activities, large group discussions, and oral presentations.  3- Understand texts using effective learning strategies for reading and vocabulary building.  4- Demonstrate an appropriate level of control of grammatical accuracy and lexical appropriacy in written and oral communication. | |
| 1. **Cognitive goals** | |
| **B. The skills goals special to the course.** | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Homework and Assignments.  3. Tests and Exams.  4. In-Class Questions and Discussions.  5. Reports and Presentations. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals** | |
| **Teaching and Learning Methods** | |
|  | |
| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 3 of article (12) | 1-5 of  article (11) | Introduction to the course | 1 | 1 hr | 1 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: Hello | 2 | 1 hr | 2 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: Hello | 3 | 1 hr | 3 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: Your world | 4 | 1 hr | 4 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: Your world | 5 | 1 hr | 5 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: Personal information | 6 | 1 hr | 6 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: Personal information | 7 | 1 hr | 7 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Family and friend | 8 | 1 hr | 8 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Family and friend | 9 | 1 hr | 9 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: It’s my life! | 10 | 1 hr | 10 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: It’s my life! | 11 | 1 hr | 11 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: Every day | 12 | 1 hr | 12 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: Every day | 13 | 1 hr | 13 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Places I like | 14 | 1 hr | 14 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Places I like | 15 | 1 hr | 15 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: Where I live | 16 | 1 hr | 16 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: Where I live | 17 | 1 hr | 17 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: Happy birthday | 18 | 1 hr | 18 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: Happy birthday | 19 | 1 hr | 19 |
| 1 – 3 of article (12) | 11-5 of  article (11) | Unit 10: We had a good time! | 20 | 1 hr | 20 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 10: We had a good time! | 21 | 1 hr | 21 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: We can do it | 22 | 1 hr | 22 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: We can do it | 23 | 1 hr | 23 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: We can do it | 24 | 1 hr | 24 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Thank you very much! | 25 | 1 hr | 25 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Thank you very much! | 26 | 1 hr | 26 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Here and now | 27 | 1 hr | 27 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Here and now | 28 | 1 hr | 28 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 14: It’s time to go | 29 | 1 hr | 29 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 14: It’s time to go | 30 | 1 hr | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | (1) New Headway Plus [Beginning] by John and Liz Soars, Oxford: Oxford University Press (2006) |
| 2. Main references (sources) | (1) Modern scientific articles from the news related to the students' specialty  ***Others***   * Notebook prepared by the instructor of the   course   * Collection of sheets of solved and unsolved * problems and Exams questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Compter/ 111WRCO** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aims of this course are to develop skilled computer users with the technical background, knowledge, and adaptability to develop well-designed, robust, computer-based solutions to a range of problems. The course introduces students to Windows and Microsoft office word and their applications. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Key Computer Components  * Internal Components (Motherboard, CPU, Memory) * Media Storage Devices (Hard Disk Storage, DVD/CD Drives, Disk Drives, Portable/Removable Devices) * Human Interface (Keyboard, Mouse, Touch Pad, Touch Screen, etc.) Video/Audio Components (Monitors, Video Processor, Speakers) Internet/LAN Devices (Modems, Network Interface Devices, Wireless Cards) * External Components (Printers, Scanners, Web Cams)  1. The Windows Operating System  * Date and Time * Task Bar, Start Button * Advanced Searches * Shutting down your computer * Files-Loading/Saving * Creating a Folder or files * Saving/Renaming folders and files * Windows Settings and Control Panel.  1. Microsoft Word Skills  * The Environment and Ribbon Command * Tabs Hiding and the Ribbon Quick Access * Toolbar Contextual * Toolbar View * Document Basics such as Starting a new Document, Saving a document, Printing a document and Text Formatting * Inserting Clip Art * Working with shapes * Line and Paragraph Spacing * Text Editing such as , Selecting Text Cut, Copy and Paste * Format Text Font, Size, Color Bold, Italics, Underline Font Effects * Auto Format Indenting Paragraphs Paragraph Borders and Shading Paragraph Alignment and Breaking. * Building Tables Creating a table Editing a table Sizing a table Formatting a table * Working with Images Inserting pictures Setting picture position and text wrapping Resizing and cropping Using clip art organizer Creating with Word Art * Modifications Columns and Ordering Headers and Footers Smart Art Applying Styles. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Understanding the importance of Information Technology for Engineering specialty. | |
| **B. The skills goals special to the course.**  B1. The skill of working with different computer components.  B2. The ability to use the Operating systems such as Windows  And Microsoft Word to prepare, design, manipulates and store different files.  B3. The Use of Word program to write scientific assays and reports.  B4. A professional user that can deal with different types of application software. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1-Examination, tests, and quizzes  2-Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves Computer problems.  C2. Gain an understanding of the role of the operating system, computer software and hardware.  C3. Ability to function effectively as an individual in a group.  C4. Have the advanced skills developed for the use of office productivity pachages. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a leader or a manager  D4. Understand all the basic concepts of information technology and its related terminologies. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Introduction to Computer science | 1 | 2 | 1 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Computer Units | 2 , 3 | 2 | 2 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Internal Components (Motherboard, CPU, Memory) | 3 , 4 | 2 | 3 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Media Storage Devices (Hard Disk Storage, DVD/CD Drives, Disk Drives, Portable/Removable Devices) | 4 | 2 | 4 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Human Interface (Keyboard, Mouse, Touch Pad, Touch Screen, etc.) | 5 | 2 | 5 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | External Components (Printers, Scanners, Web Cams) | 5 | 2 | 6 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Software | 6 | 2 | 7 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Introduction To Windows** | 6 | 2 | 8 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Date and Time, Task Bar | 7 | 2 | 9 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Creating a Folder Creating a File Loading a File | 7 , 8 | 2 | 10 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Advanced Searche | 5, 6, 7, 8 | 2 | 11 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Making Changes Saving/Renaming | 9, 10 | 2 | 12 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Moving Files Renaming Making a Copy Copy Files onto a dis | 9, 10 | 2 | 13 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Windows Settings | 9,10 | 2 | 14 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Control Panel | 11 | 2 | 15 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | The Word Ribbon and Command Tabs | 11 | 2 | 16 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Starting a new Document | 11 | 2 | 17 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Printing a document | 12 | 2 | 18 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Formatting text | 12 | 2 | 19 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Inserting Clip Art | 13 | 2 | 20 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Working with shapes | 13 | 2 | 21 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Editing basics | 15 | 2 | 22 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Cut, Copy, Paste | 15 | 2 | 23 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Font format and Effects | 15 | 2 | 24 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Creating a table | 15 | 2 | 25 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Formatting a table | 15 | 2 | 26 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Inserting pictures | 16 | 2 | 27 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Creating with Word Art | 16 | 2 | 28 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Columns and Ordering | 17 | 2 | 29 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Applying Styles and themes | 17, 18 | 2 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Textbook  Ghassan Hamid Abdul Majed , (2014) "Computer Fundamentals" Book store for printing publishing and translating . |
| 2. Main references (sources) | IC3 Test Guide (2019) . Certiport.   * MOS study guide 2016 Exam (77-725) .Pearson education |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| --- | --- |
| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Mathematics II, 210 WRMA** |
| **4. Modes of Attendance offered** | Annual System, where the academic year is composed of 30-week regular subjects.  Each graduating student has to successfully complete 163 credits. Each subject credit is one 50-minute lecture a week or 3 hours of lab a week. There is no on-line subject which may be used as supplementary material for the class room instruction  Online lectures have been providing to the students using Google Classroom Application |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Find sketches, derivation and integration of hyperbolic.  2. Inverse hyperbolic functions and their applications (Catenary Cables)  3. Achieve the transformation between the Polar and Cartesian.  4. Coordinates and graph of polar functions, conic sections in polar coordinates and their sketches and derivative and integration of polar equations.  5. Analyze of vectors in space with the dot and cross product techniques and find the equations of line and plane in space and the product of three or more vectors.  6. Derivatives of vectors and find the tangential and normal components velocity and acceleration in polar form.  7. Find the derivative of functions of more than one variable and use of chain Rule and non-independence.  8. Evaluation of the directional derivatives and the related applications.  9. How to apply the partial derivatives in the engineering problems and the higher order derivatives and the extreme points. .  10. Use Lagrange Multiplier with constraint.  11. Understand the double integrals with definition, theory and how to find the region of integral with applications.  12. Evaluate the double integrals in polar form, surface area and volume.  13. Use the sequences and series in the field of engineering and the tests of them for convergence.  14. Specify the alternative series and their tests.  15. Use of power series and their convergence.  16. Use of complex numbers in different forms and operations. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures  2. Tutorials  3. Homework and Assignments  4. Tests and Exams  6. In-Class Questions and Discussions  7. Connection between Theory and Application | |
| **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).  Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-7 of article (11) | Definition of hyperbolic functions |  | 3 theo.1tutorial | 1 |
| = | = | Inverse hyperbolic |  | = | 2 |
| = | = | Applications |  | = | 3 |
| = | = | Polar Coordinates and graph of polar functions |  | = | 4 |
| = | = | Conic sections in polar coordinates and their sketches |  | = | 5 |
| = | = | Derivative and integration of polar equations |  | = | 6 |
| = | = | Vectors: components , unit vectors |  | = | 7 |
| = | = | Dot and cross product |  | = | 8 |
| = | = | Equation of line and plane in space |  | = | 9 |
| = | = | Product of three or more vectors |  | = | 10 |
| = | = | Derivatives of vectors and tangential and normal components |  | = | 11 |
| = | = | Velocity and acceleration in polar form |  | = | 12 |
| = | = | Introduction to Partial derivative |  | = | 13 |
| = | = | Chain Rule and non-independence |  | = | 14 |
| = | = | Directional derivatives and the applications |  | = | 15 |
| = | = | Applications of partial derivatives |  | = | 16 |
| = | = | Higher order derivatives and the extreme points |  | = | 17 |
| = | = | Higher order derivatives and the extreme points |  | = | 18 |
| = | = | Largrange multiplier with constraint |  | = | 19 |
| = | = | Double integrals , definition and theory |  | = | 20 |
| = | = | Applications |  | = | 21 |
| = | = | Double integrals in polar form |  | = | 22 |
| = | = | Surface area and volume |  | = | 23 |
| = | = | Sequences and series |  | = | 24 |
| = | = | Tests for convergence |  | = | 25 |
| = | = | Tests for convergence |  | = | 26 |
| = | = | Alternative series and their tests |  | = | 27 |

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| = | = | Power series and their convergence |  | = | 28 |
| = | = | Complex numbers and operations |  | = | 29 |
| = | = | Complex numbers and operations |  | = | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Calculus: ( Ross L. Finney and George B. Thomas , 1989) 2. Thomas’ Calculus :(George B. Thomas, Maurice D. Weir and Joel R. Hass , 2011, 12th Edition)   حساب التفاضل والتكامل :( فرانك ايرز جونيور و اليوت مندلسون) |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Computer Programming, 211 WRM** |
| **4. Modes of Attendance offered** | 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-week regular subject. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| 6**. Number of hours tuition (total)** | 60 hrs, 2 theoretical and 2 tutorials |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The course aims to introduce students to   1. Introduce students to how to use Matlab and program mathematical operations. 2. Learn about vectors and matrices, how to deal with them, methods of input and output, and the use of some of their functions, as well as solving and drawing complex mathematical equations. 3. Giving accurate details in the style of graphs with regard to colors and other drawing elements, and knowing various methods for creating drawings in two and three dimensions and deal with them. 4. Knowing the different methods of data input and output and how to write programs in (m-files) format, in addition to acquiring the skill of importing and exporting data and storing them in tables. 5. Using relational and logical operators together with mathematical expressions in writing practical and applied programs | |
| **9· Learning Outcomes, Teaching, Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. The ability to apply knowledge in the field of MATLAB.  A2. The ability to use mathematical and logical functions and arithmetic operations and implement them in practice.  A3. The ability to create and manipulate arrays.  A4. The ability to write any applied program in the field of water resources engineering. | |
| 1. **The skills goals special to the course.**   B1. The student acquires the skill of programming thinking.  B2. The student acquires the skill of using the Matlab program in various applications.  B3. The student acquires the skill of exchanging data between the different programs  B4. The student acquires the skill of producing and editing graphs. | |
| **Teaching and Learning Methods** | |
| 1. Academic lectures  2. The practical laboratory  3. Discussion and dialogue in the classroom  4. Homework is one of the practical examples available | |
| **Assessment methods** | |
| 1. Monthly and final exams.  2. Daily practical tests inside the laboratory.  3. Daily activities and participation.  4. Regular questions, which depend on the method of brainstorming ideas. | |
| 1. **Affective and value goals**   C1. Analysis, explanation and comparison.  C2. accuracy of observation and depth of thinking.  C3. speed of retrieval of information and a priori conclusion.  C4. speed and accuracy of decision-making. | |
| **Teaching and Learning Methods** | |
| 1. Directing distinctive questions and inquiries with depth and accuracy.  2. Directing the student to understand the cause and the cause.  3. Development of digital sense in expression.  4. Brainstorming. | |
| **Assessment methods** | |
| 1. Individualizing a part of the examination questions that require depth of thinking, explanation and accuracy of observation  2. The student’s participation in the classroom.  3. Extracurricular duties. | |
| 1. **General and rehabilitative transferred skills (other skills relevant to employability and personal development)**   D1. Developing the student's ability and ability to use computer programs  D2. Developing the student's ability and ability to deal with modern technologies related to the vocabulary of the course  D3. Developing the student's ability and ability to face problems and dilemmas and find appropriate solutions to them  D4. Developing the student's ability and ability to translate academic information into practical reality. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| Written + Practical Exam | Theory + practical lectures | General introduction to programming in Matlab language (program operation, desktop, main windows) | Theoretical + practical | 4 | 1. |
| Written + Practical Exam | Theory + practical lectures | Constants, Variables and Symbols, Arithmetic expression | Theoretical + practical | 4 | 2. |
| Written + Practical Exam | Theory + practical lectures | Arithmetic and symbolic sentence, programmed functions | Theoretical + practical | 4 | 3. |
| Written + Practical Exam | Theory + practical lectures | Arrays and operations on matrices (create a matrix) | Theoretical + practical | 4 | 4. |
| Written + Practical Exam | Theory + practical lectures | Matrix addressing and indexing. Calculations between matrices and between matrix and singular number | Theoretical + practical | 4 | 5. |
| Written + Practical Exam | Theory + practical lectures | Standard Matrices, Find solutions of linear equations | Theoretical + practical | 4 | 6. |
| Written + Practical Exam | Theory + practical lectures | Find a partial matrix | Theoretical + practical | 4 | 7. |
| Written + Practical Exam | Theory + practical lectures | Modification of array values ​​(recall, substitution, add) | Theoretical + practical | 4 | 8. |
| Written + Practical Exam | Theory + practical lectures | Raster operations between matrices | Theoretical + practical | 4 | 9. |
| Written + Practical Exam | Theory + practical lectures | Functions that apply to arrays | Theoretical + practical | 4 | 10. |
| Written + Practical Exam | Theory + practical lectures | Create 2D graphs using the two commands (plot and fplot) | Theoretical + practical | 4 | 11. |
| Written + Practical Exam | Theory + practical lectures | Modify graphics using the Edit commands, add dimensions and text to the graphics | Theoretical + practical | 4 | 12. |
| Written + Practical Exam | Theory + practical lectures | Inserting two or more curves into one window, dividing the window into several drawings, assigning logarithmic axes | Theoretical + practical | 4 | 13. |
| Written + Practical Exam | Theory + practical lectures | Create drawings by columns, stairs, forming histograms, drawings of polar coordinates | Theoretical + practical | 4 | 14. |
| Written + Practical Exam | Theory + practical lectures | Create 3D graphs | Theoretical + practical | 4 | 15. |
| Written + Practical Exam | Theory + practical lectures | Using (m-file), various input statements | Theoretical + practical | 4 | 16. |
| Written + Practical Exam | Theory + practical lectures | Various output phrases | Theoretical + practical | 4 | 17. |
| Written + Practical Exam | Theory + practical lectures | Import data and export results | Theoretical + practical | 4 | 18. |
| Written + Practical Exam | Theory + practical lectures | Boolean and relative expressions | Theoretical + practical | 4 | 19. |
| Written + Practical Exam | Theory + practical lectures | Conditional sentences using the command  (if-statement) | Theoretical + practical | 4 | 20. |
| Written + Practical Exam | Theory + practical lectures | Conditional sentences using the command  (switch-case) | Theoretical + practical | 4 | 21. |
| Written + Practical Exam | Theory + practical lectures | Loops using the command  (for-end loops) | Theoretical + practical | 4 | 22. |
| Written + Practical Exam | Theory + practical lectures | Loops using the command  (while-end loops) | Theoretical + practical | 4 | 23. |
| Written + Practical Exam | Theory + practical lectures | Loops and nested conditional statements | Theoretical + practical | 4 | 24. |
| Written + Practical Exam | Theory + practical lectures | Building declarations | Theoretical + practical | 4 | 25. |
| Written + Practical Exam | Theory + practical lectures | Local and global variables | Theoretical + practical | 4 | 26. |
| Written + Practical Exam | Theory + practical lectures | Store and call the declarative function | Theoretical + practical | 4 | 27. |
| Written + Practical Exam | Theory + practical lectures | Comparison of (script file) and declarative function | Theoretical + practical | 4 | 28. |
| Written + Practical Exam | Theory + practical lectures | Find the roots of polynomial equations | Theoretical + practical | 4 | 29. |
| Written + Practical Exam | Theory + practical lectures | Fit geometric curves | Theoretical + practical | 4 | 30. |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Matlab an introduction with application fifth edition/ Amos Gilat/ Department of Mechanical Engineering, The Ohio State University |
| 2. Main references (sources) | * Introduction to MATLAB by Dr. Sikander M.Mirza * Introduction to Matlab for Engineering Students David Houcque, Northwestern University (version 1.2, August 2005) * MATLAB Programming for Biomedical Engineers and Scientists 1st Edition, Kindle Edition by Andrew P. King (Author), Paul Aljabar (Author) |
| A- Recommended books and references scientific journals, reports…). | Books located in the Central Library |
| B-Electronic references, Internet  sites… | Various internet sources |
| **12. The development of the curriculum plan** | |
| Motivate students to use modern means and the Internet to develop their skills in computer applications using computer programs and simulation programs. | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Strength of Materials / 212WESM** |
| **4. Modes of Attendance offered** | 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-week regular subjects.  Online lectures have been providing to the students using Google Classroom platform. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. The objective of this course is to develop a successful machine or structural design to use mathematical reasoning and critical thinking from the output. 2. This course provides and encourages students to understand that practically impossible to have a successful design without the use of engineering mechanics and strength of materials. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Introduction to strength of Materials versus Engineering Mechanics. 2. Introduces the Simple stresses and Thin walled cylinders. 3. Introduces the Simple strain such as normal and shear strain. 4. Develop a successful understanding to Hook’s law, Young modulus of elasticity and Poisson’s ratio. 5. Introduces the Torsion such as in Solid and hollow circular shafts. 6. Construct shear and bending diagrams in beams. 7. Introduces stresses in beams: Flexural Stresses in beams. 8. Introduces Beam deflection. 9. Introduces Combined stresses and Mohr’s Circle. 10. Develop a successful theoretical reasoning and critical thinking from the output. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1.Lectures and Lectures Notes  2. Tutorials  3. Homework and Assignments  4. Tests and Exams  5. In-Class and online Questions and Discussions  6. Connection between Theory and Application  7. Extracurricular Activities  8. Seminars  9. In- and Out-Class oral discussion with students  10. Online lectures have been providing to the students using Google Classroom Application. | |
| **Assessment methods** | |
| Examinations, Tests, and Quizzes  1. Extracurricular Activities  2. Student Engagement during Lectures  3. In-class and online tests, and quizzes.  4. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor)  Curriculum and Faculty Member (Instructor) | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1.Lectures and Lectures Notes  2. Online Questions and Discussions  3. Out-Class oral discussion with students  4. Online lectures have been providing to the students using Google Classroom Application. | |
| **Assessment methods** | |
| 1. Online discussion and conversation.  2. Respect deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-10 of  article (11) | Definition of simple stresses | 1-2 | 3  2 the.  1 tut. | 1 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Normal stress and axial force diagram | 1-2 | 3  2 the.  1 tut. | 2 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Equilibrium equation and free body diagram | 1-2 | 3  2 the.  1 tut. | 3 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Determination of internal forces | 1-2 | 3  2 the.  1 tut. | 4 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Simple normal stress | 1-2 | 3  2 the.  1 tut. | 5 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Simple Shear stress | 1-2 | 3  2 the.  1 tut. | 6 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Simple bearing stress | 1-2 | 3  2 the.  1 tut. | 7 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Stress in thin-walled cylinder | 1-2 | 3  2 the.  1 tut. | 8 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Stress-strain diagram, Hook' law | 3-4 | 3  2 the.  1 tut. | 9 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Axial deformation, Poisson' ratio | 3-4 | 3  2 the.  1 tut. | 10 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Biaxial deformation | 3-4 | 3  2 the.  1 tut. | 11 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Relation between modulus of rigidity and modulus of elasticity | 4 | 3  2 the.  1 tut. | 12 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Derivation of horizontal shearing stress formula | 5 | 3  2 the.  1 tut. | 13 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Derivation of horizontal shearing stress formula | 5 | 3  2 the.  1 tut. | 14 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Derivation of horizontal shearing stress formula | 5 | 3  2 the.  1 tut. | 15 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Shear-force diagram  by section method | 6 | 3  2 the.  1 tut. | 16 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Bending moment diagram  by section | 6 | 3  2 the.  1 tut. | 17 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Shear-force diagram  by area method | 6 | 3  2 the.  1 tut. | 18 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Bending moment diagram  by area method | 6 | 3  2 the.  1 tut. | 19 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Derivation of flexural stress formula | 7 | 3  2 the.  1 tut. | 20 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Flexural stress in un-symmetrical section | 7 | 3  2 the.  1 tut. | 21 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Derivation of differential equation for elastic curve | 8 | 3  2 the.  1 tut. | 22 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Deflection by double integration method | 8 | 3  2 the.  1 tut. | 23 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Theorem of area moment method | 8 | 3  2 the.  1 tut. | 24 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Moment diagram by part | 8 | 3  2 the.  1 tut. | 25 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Deflection by moment area of cantilever and simple beams | 8 | 3  2 the.  1 tut. | 26 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Deflection by method of superposition | 8 | 3  2 the.  1 tut. | 27 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Combined stresses | 9 | 3  2 the.  1 tut. | 28 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Variation of stress at a point, Analytical derivation | 9 | 3  2 the.  1 tut. | 29 |
| 1 – 4 of article (12) | 1-10 of  article (11) | Determination of stresses at a point by Mhor's circle | 9 | 3  2 the.  1 tut. | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | “Strength of Materials”; by Ferdinand L.  Singer/ Andrew Pytel, Third edition 1980 |
| 2. Main references (sources) | 1. “Mechanics of materials"; by  Russel C. Hibbeler , Seven Edition, 2008  2. An introduction to mechanical engineering part 1by Clifford et al. 2009.  2-"Introduction to mechanics of solid"; By  Popov,E. P., 1968.  3-"Elements of strength of materials"; By  Timoshinko and Young, 4th edition, 1962 |
| A- Recommended books and references scientific journals, reports…). | 1. Notebook prepared by the instructor of the   course   1. Collection of sheets of solved and   unsolved problems and Exam questions |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Components of Hydraulic Structures/ 213 WRCS** |
| **4. Modes of Attendance offered** | One time, day time on campus |
| **5. Semester/Year** | 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hrs / 3 hrs per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Definitions of Engineering projects and component.  2. Definitions Foundations type and draw it by using AutoCAD program  3. Definitions Retaining walls type and draw it by using AutoCAD program  4. Explain the Irrigation and drainage component  5. Definitions Control and Regulator Structure and draw it by using AutoCAD program  6. Definitions Crossing Structure and draw it by using AutoCAD program  7. Definitions Protection structure and draw it by using AutoCAD program  8. Definitions Dams and spillways and draw it sections by using AutoCAD | |
| 9· Learning Outcomes, Teaching ,Learning and Assessment Method  the student in the field of water resources engineering will be able to:  1. Understand general introduction about engineering project specially irrigation project  2. Understand foundation and retaining wall types, description and sketching  3. Understand irrigation network type, longitudinal and cross section of canals  4. Understand drainage network type, longitudinal and cross section of drain  5. Understand control and regulatory structure component, description and sketching  6. Understand crossing structure component, description and sketching  7. Understand protection structure component, description and sketching  8. Understand dams and spillways component, description and sketching. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| * lectures, * lab work * Homework and Assignments * Tests and Exams * In-Class Questions and Discussions * Connection between Theory and Application * Extracurricular Activities | |
| **Assessment methods** | |
| * homework**,** * quizzes, * major examination during the course, and * final examination. | |
| **C. Affective and value goals**  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability. | |
| **D. General and rehabilitative transferred skills** (other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-7 of article (11) | Introduction and Engineering projects | a | 3  1 (theo.) +2 (lab.) | 1 |
| 1 – 4 of article (12) | 1-7 of article (11) | Foundations | a,b | 3  1 (theo.) +2 (lab.) | 2 |
| 1 – 4 of article (12) | 1-7 of article (11) | Retaining walls | a,b,c | 3  1 (theo.) +2 (lab.) | 3 |
| 1 – 4 of article (12) | 1-7 of article (11) | Irrigation Networks | a,b,c,d | 3  1 (theo.) +2 (lab.) | 4 |
| 1 – 4 of article (12) | 1-7 of article (11) | Irrigation Networks | a,b,c,d | 3  1 (theo.) +2 (lab.) | 5 |
| 1 – 4 of article (12) | 1-7 of article (11) | Irrigation Structure | a,b,c,d | 3  1 (theo.) +2 (lab.) | 6 |
| 1 – 4 of article (12) | 1-7 of article (11) | Control and Regulatory Structure | a,b,c,d | 3  1 (theo.) +2 (lab.) | 7 |
| 1 – 4 of article (12) | 1-7 of article (11) | Control and Regulatory Structure | a,b,c,d | 3  1 (theo.) +2 (lab.) | 8 |
| 1 – 4 of article (12) | 1-7 of article (11) | Crossing Structure | a,b,c,d,e | 3  1 (theo.) +2 (lab.) | 9 |
| 1 – 4 of article (12) | 1-7 of article (11) | Crossing Structure | a,b,c,d,e | 3  1 (theo.) +2 (lab.) | 10 |
| 1 – 4 of article (12) | 1-7 of article (11) | Protection Structure | a,b,c,d,e | 3  1 (theo.) +2 (lab.) | 11 |
| 1 – 4 of article (12) | 1-7 of article (11) | Protection Structure | a,b,c,d,e,f | 3  1 (theo.) +2 (lab.) | 12 |
| 1 – 4 of article (12) | 1-7 of article (11) | Dams and Spillways | a,b,c,d,e,f | 3  1 (theo.) +2 (lab.) | 13 |
| 1 – 4 of article (12) | 1-7 of article (11) | Dams and Spillways | a,b,c,d,e,f,g | 3  1 (theo.) +2 (lab.) | 14 |
| 1 – 4 of article (12) | 1-7 of article (11) | Irrigation Structure Seminar | a,b,c,d,e,f,g | 3  1 (theo.) +2 (lab.) | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | **Textbook**  “Irrigation Drawing”, Arabic book by Abd Al-Riza, Abd Al-Rasool, Baghdad, 1992 |
| 2. Main references (sources) | **References**  "Hydraulic Canals",by J. Montanes  "Principles of irrigation Engineering", by Newell & Murphy |
| A- Recommended books and references scientific journals, reports…). | **Others**  1. Notebook prepared by the instructor of the course  2. Collection of sheets of solved and  unsolved problems and Exams questions |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| Review the coarse syllabus after two years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Surveying, 214 WRSU** |
| **4. Modes of Attendance offered** | 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-week regular subject. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| 6**. Number of hours tuition (total)** | 150 hrs / 5 hrs per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8.** **Aims of the Course** | |
| The course aims to introduce students to   1. The basics of surveying, methods of measuring horizontal and vertical distances, and knowing how to set-out a building or survey a specific area. 2. Calculating ground elevation of points, leveling and adjusting the ground, producing longitudinal and cross-sectional maps, determining the final volume of earthworks in engineering projects. 3. Producing and interpreting contour maps and using them in determining the nature of the land and its slope and calculating the quantities of excavation or filling in it. 4. Measuring horizontal and vertical angles, forming of travers, calculating the geographical coordinates of points and adjusting them. 5. Finding areas of regular and irregular shapes in different ways of surveying and linking them with contemporary technology by using new foundations for surveying. 6. Using modern electronic measuring devices as a Total Station instrument in measuring polygon lengths, interior angles and coordinates. | |
| **9· Learning Outcomes, Teaching, Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. The learner will be able to read any engineering plan, whether civil or architectural.  A2. Knowing the details and methods of surveying and leveling and the steps followed for each type.  A3. The learner will be able to project maps on the real earth surface or transfer a picture of natural location on the map.  A4. Determine the height of the land above sea level and link it to the height of the neighboring buildings.  A4. | |
| **B.** **The skills goals special to the course.**  B1. Works to solve the problems in an intellectual way and according to the available data  B2. Thinks in an engineering way when calculating areas and volumes for earthworks.  B3. Acquires skill in the use of surveying devices and tools.  B4. Acquires the skill of preparing reports, calculating results, and producing the required maps | |
| **Teaching and Learning Methods** | |
| 1. Theoretical Lectures. 2. Practical and laboratory experiments 3. Data Show 4. Reading methodological and source books and looking at some websites (self-learning). 5. Science films. 6. Using and touching modern electronic software. | |
| **Assessment methods** | |
| 1. Monthly and final exams. 2. Short daily exams 3. Discussion in the classroom. 4. Practical tests. | |
| 1. **Affective and value goals**   C1. Adheres to the ethics of the educational institution.  C2. Work as a teamworking.  C3. Receives and accepts knowledge.  C4. Fast and accurate in a decision-making. | |
| **Teaching and Learning Methods** | |
| 1. Assigning students to tasks in groups, such as homework, within a specific period of time. 2. Preparing researches and reports by making use of the library and the Internet. | |
| **Assessment methods** | |
| 1. Note the duties and solve them. 2. Making a questionnaire form for the students. | |
| 1. **General and rehabilitative transferred skills (other skills relevant to employability and personal development)**   D1.The skill of recitation and expressing an opinion in the lecture through the (seminar).  D2. The skill of discussion in the lecture.  D3. The skill of solving problems through workshops.  D4. The skill of creativity and the ability to solve brainstorming problems. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| Written + Practical Exam | Theory + Practical Lectures | General basics of surveying | Theory and Practical | 5 | 1. |
| Written + Practical Exam | Theory + Practical Lectures | Units of measurements, Plotting scale | Theory and Practical | 5 | 2. |
| Written + Practical Exam | Theory + Practical Lectures | Linear measurements. Means for measuring distances | Theory and Practical | 5 | 3. |
| Written + Practical Exam | Theory + Practical Lectures | Direct method of horizontal distances measurements | Theory and Practical | 5 | 4. |
| Written + Practical Exam | Theory + Practical Lectures | Errors in surveying. Types of errors | Theory and Practical | 5 | 5. |
| Written + Practical Exam | Theory + Practical Lectures | Accuracy and precision, principles of errors scattering theory | Theory and Practical | 5 | 6. |
| Written + Practical Exam | Theory + Practical Lectures | Obstacles to measuring | Theory and Practical | 5 | 7. |
| Written + Practical Exam | Theory + Practical Lectures | Leveling instruments | Theory and Practical | 5 | 8. |
| Written + Practical Exam | Theory + Practical Lectures | Booking and reducing the levels  (Rise and Fall method) | Theory and Practical | 5 | 9. |
| Written + Practical Exam | Theory + Practical Lectures | Booking and reducing the levels  (Height of Instrument method) | Theory and Practical | 5 | 10. |
| Written + Practical Exam | Theory + Practical Lectures | Sources of errors in leveling | Theory and Practical | 5 | 11. |
| Written + Practical Exam | Theory + Practical Lectures | Longitudinal sections | Theory and Practical | 5 | 12. |
| Written + Practical Exam | Theory + Practical Lectures | Calculation of cut and fill | Theory and Practical | 5 | 13. |
| Written + Practical Exam | Theory + Practical Lectures | Areas of cross-sections | Theory and Practical | 5 | 14. |
| Written + Practical Exam | Theory + Practical Lectures | Contour lines: method of drawing and construction | Theory and Practical | 5 | 15. |
| Written + Practical Exam | Theory + Practical Lectures | Volume computation from cross-sections and contour map | Theory and Practical | 5 | 16. |
| Written + Practical Exam | Theory + Practical Lectures | Volume from topographic maps and grid net | Theory and Practical | 5 | 17. |
| Written + Practical Exam | Theory + Practical Lectures | Areas of rectilinear Shapes (Mathematical, Coordinates, D.M.D, Planimeter) | Theory and Practical | 5 | 18. |
| Written + Practical Exam | Theory + Practical Lectures | Areas of Irregular Shapes  (Mid-ordinate, Trapezoidal, Simpson’s) | Theory and Practical | 5 | 19. |
| Written + Practical Exam | Theory + Practical Lectures | Bearing and angles | Theory and Practical | 5 | 20. |
| Written + Practical Exam | Theory + Practical Lectures | Theodolite instrument (horizontal and vertical angles) | Theory and Practical | 5 | 21. |
| Written + Practical Exam | Theory + Practical Lectures | Methods of angles measurement and bearing calculation | Theory and Practical | 5 | 22. |
| Written + Practical Exam | Theory + Practical Lectures | Traversing, Types of traverse | Theory and Practical | 5 | 23. |
| Written + Practical Exam | Theory + Practical Lectures | Horizontal Position Fixing (Trilateration, Triangulation) | Theory and Practical | 5 | 24. |
| Written + Practical Exam | Theory + Practical Lectures | Traverse adjustment  (Compass Rule) | Theory and Practical | 5 | 25. |
| Written + Practical Exam | Theory + Practical Lectures | Traverse adjustment  (Transit Rule) | Theory and Practical | 5 | 26. |
| Written + Practical Exam | Theory + Practical Lectures | Local Attraction in Compass Surveying | Theory and Practical | 5 | 27. |
| Written + Practical Exam | Theory + Practical Lectures | Global Positioning Systems for land surveying | Theory and Practical | 5 | 28. |
| Written + Practical Exam | Theory + Practical Lectures | Total Station Survey | Theory and Practical | 5 | 29. |
| Written + Practical Exam | Theory + Practical Lectures | Remote Sensing and GIS | Theory and Practical | 5 | 30. |

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| **11. Infrastructure** | |
| 1. Books Required reading: | * Engineering Survey Dr. Naji Tawfiq - College of Engineering University of Baghdad * Flat area d. Fawzi Al-Khalisi - Ministry of Higher Education, Research and Scientific. * Flat and water area, Dr. Ali Shukri - Faculty of Engineering - University of Alexandria. |
| 2. Main references (sources) | * A Text Book of Surveying by Jawahar Sharma * Engineering surveying by W.Schofield and M.Breach * Surveying by A.M.Chandara * Text book of surveying/S.K.Husain M.S.Naga Raj. * Introduction to surveying (second edition) by Michael Minchin * Surveying/Narinder Singh * Surveying for construction/William Irvine * Engineering Surveying by Yassin Taha Obaid * Engineering &Cadastral Surveying by Zaid Abdul Jabbar |
| A- Recommended books and references scientific journals, reports…). | Books located in the Central Library |
| B-Electronic references, Internet sites… | Various internet sources |
| **12. The development of the curriculum plan** | |
| The course will be developed through the following:   1. The time link between theoretical and practical lectures, so that the material is clearer to the student. 2. Holding scientific seminars based on mutual dialogue based on discussion between students and the teaching staff within the topics of the decided curriculum. 3. More workshops and brainstorming questions. 4. Enhancing the understanding and awareness of the student through making scientific trips in order to link the theoretical reality with the professional practical reality. | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Soil Physics/ 215 WRSP** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 75 hrs / 5 hrs per week, 2 hrs theoretical, 1 hr tutorial, and 2 hrs laboratory |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1- Introduce definition of soil physics and physical proprieties of soil.  2- Specific surface area of soil particles.  3- Definition of soil structure and aggregation.   1. Introduce Soil water, energy state of water in soil. 2. Soil moisture characteristic curve. 3. Water flow in saturated soil. 4. Water flow in unsaturated soil. 5. Introduce definition of soil Infiltration. 6. Redistribution of water in soil profile | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Reports and presentations. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| In-Class Questions and Discussions. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty. | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-3 of article (11) | 1-7 of article (10) | Introduction about soil, soil physics | A, B,C,D | 5 | 1 |
| 1-3 of article (11) | 1-8 of article (10) | Soil physical properties | A, B,C,D | 5 | 2 |
| 1-3 of article (11) | 1-8 of article (10) | soil characteristics ,solid state | A, B,C,D | 5 | 3 |
| 1-3 of article (11) | 1-8 of article (10) | Particle size distribution, textural fraction | A, B,C,D | 5 | 4 |
| 1-3 of article (11) | 1-8 of article (10) | Specific surface area of soil particles | A, B,C,D | 5 | 5 |
| 1-3 of article (11) | 1-8 of article (10) | Soil structure and aggregation | A, B,C,D | 5 | 6 |
| 1-3 of article (11) | 1-8 of article (10) | Water content and potential | A, B,C,D | 5 | 7 |
| 1-3 of article (11) | 1-8 of article (10) | Soil water, energy state of water in soil | A, B,C,D | 5 | 8 |
| 1-3 of article (11) | 1-8 of article (10) | Soil moisture characteristics curve | A, B,C,D | 5 | 9 |
| 1-3 of article (11) | 1-8 of article (10) | Water flow in saturated soil | A, B,C,D | 5 | 10 |
| 1-3 of article (11) | 1-8 of article (10) | Water flow in saturated soil | A, B,C,D | 5 | 11 |
| 1-3 of article (11) | 1-8 of article (10) | Flow in a composite column | A, B,C,D | 5 | 12 |
| 1-3 of article (11) | 1-8 of article (10) | Water flow in unsaturated soil | A, B,C,D | 5 | 13 |
| 1-3 of article (11) | 1-8 of article (10) | Water flow in unsaturated soil | A, B,C,D | 5 | 14 |
| 1-3 of article (11) | 1-8 of article (10) | Infiltration of water in soil | A, B,C,D | 5 | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Introductory Soil Physics, Univ. of Colifornia, Davis 2000 Applied Soil Physics, Hanker & Ashcrof |
| 2. Main references (sources) | Introduction to Soil Physics, Hillel, D. 1982   * Method of Soil Analysis, USSSS, 1972 |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Land Reclamation, 216 WRLR** |
| **4. Modes of Attendance offered** | Five hours of study a week per unit day time on campus The academic year is composed of 15-week regular subjects. |
| **5. Semester/Year** | 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 75 hr., five hours per week 3 hr. theoretical and 2 hr. laboratory |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to understand basic concepts of land reclamation, salt affected soils, program performance for reclamation of saline soils field and laboratory surveying and investigation, leaching requirement and assessment of water quality irrigation. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  The student in the field of land reclamation will be able to:   1. Introduce basic definitions and introductory concept of land reclamation, 2. Introduce basic definitions of salt affected soils, characteristics, classification and distribution, and the properties of some important salts, 3. Introduce the program performance for reclamation of saline soils, 4. Introduce the fundamental leaching, leaching method and time of leaching, 5. Determination the leaching efficiency coefficient, leaching requirement, leaching curve, 6. Introduce the mathematical model to predict leaching water amount, 7. Introduce the development post reclamation, and maintenance leaching, 8. Salt balance in reclaimed soil, 9. Assessment of irrigation water quality 10. Introduce comparison between reclamation of gypsiferous, calcareous and desert soils | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A2. An ability to design a system, or components, or process to meet desired needs.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context.  . | |
| **B. The skills goals special to the course.**  B1. B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **10. Teaching and Learning Methods** | |
| 1- Lectures  2- Tutorials  3- Homework and Assignments  4- Tests and Exams  5- In-Class Questions and Discussions  6- Connection between Theory and Application  7- Extracurricular Activities  8- Lab examination  9-Seminer | |
| **11. 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). | |
| 12. **Grading Policy**   1. Term Tests 25 %. 2. Homework**,** 10% 3. Lab examination and report 15% 4. Final examination 50%   - The final exam will be comprehensive. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods**  Respecting deadlines | |
| **D. General and rehabilitative transferred skills**  (other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility. | |
| Teaching and Learning Methods  Oral quizzes | |
| **Assessment methods**  Write reports | |

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| ***13. Course Structure*** | | | | | |
| Assessment  Method | Teaching  Method | Unit/Module or  Topic Title | LOs  ( Article | Hour | Week |
| 1-4 of article (11) | 1-9 of article(10) | Land reclamation concept | a,b,c | 5  2 theo  1 tut  2 lab | 16 |
| 1-4 of article (11) | 1-9 of article(10) | 1-9 of article(11) | a,b,c | 5  2 theo  1 tut  2 lab | 17 |
| 1-4 of article (11) | 1-9 of article(10) | Properties of some important salt | a,b,c | 5  2 theo  1 tut  2 lab | 18 |
| 1-4 of article (11) | 1-9 of article(10) | Program performance for reclamation of saline soils, field and laboratory surveying and investigation, leaching requirements | a,b,c | 5  2 theo  1 tut  2 lab | 19 |
| 1-4 of article (11) | 1-9 of article(10) | Leaching curve, equations, mathematical form and modeling, leaching efficiency coefficient | a,b,c | 5  2 theo  1 tut  2 lab | 20 |
| 1-4 of article (11) | 1-9 of article(10) | Leaching curve, equations, mathematical form and modeling, leaching efficiency coefficient | a,b,c | 5  2 theo  1 tut  2 lab | 21 |
| 1-4 of article (11) | 1-9 of article(10) | Leaching methods and time of leaching | a,b,c | 5  2 theo  1 tut  2 lab | 22 |
| 1-4 of article (11) | 1-9 of article(10) | Salt balance in reclaimed soils | a,b,c | 5  2 theo  1 tut  2 lab | 23 |
| 1-4 of article (11) | 1-9 of article(10) | Salt storage variation | a,b,c | 5  2 theo  1 tut  2 lab | 24 |
| 1-4 of article (11) | 1-9 of article(10) | Leaching fraction calculations | a,b,c | 5  2 theo  1 tut  2 lab | 25 |
| 1-4 of article (11) | 1-9 of article(10) | Irrigation water, quality, classification and assessment for reclamation | a,b,c | 5  2 theo  1 tut  2 lab | 26 |
| 1-4 of article (11) | 1-9 of article(10) | Irrigation water quality, classification and assessment for reclamation | a,b,c | 5  2 theo  1 tut  2 lab | 27 |
| 1-4 of article (11) | 1-9 of article(10) | Reclamation of gypsiferous soil | a,b,c | 5  2 theo  1 tut  2 lab | 28 |
| 1-4 of article (11) | 1-9 of article(10) | Reclamation of desert and sandy soils | a,b,c | 5  2 theo  1 tut  2 lab | 29 |
| 1-4 of article (11) | 1-9 of article(10) | Reclamation of calcareous soils | a,b,c | 5  2 theo  1 tut  2 lab | 30 |

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| **14. Infrastructure** | |
| 1. Books Required reading: |  |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). | 1. FAO (1988). Salt –Affected Soils and their Management 2. Dieleman P. J. et. al. (1977) Reclamation of Salt-Affected Soils in Iraq. World soil resources report. 3. US Salinity Laboratory Staff. (1954) Diagnosis and Improvement of Saline and Alkali soils. Agriculture Handbook No.60 |
| B-Electronic references, Internet  sites… |  |
| **15. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Water Quality and Treatment, 217 WRWM** |
| **4. Modes of Attendance offered** | Four hours of study a week per unit day time on campus The academic year is composed of 30-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 120 hr., four hours per week 2 hr. theoretical and 2 hr. laboratory |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to introduce the students on the area of water pollution and wastewater treatment plant. The course will cover wastewater treatment plant, primary, secondary & tertiary treatment process, sludge digestion and disinfection and design of water/wastewater treatment plant. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  The student in the field of water quality and treatment will be able to:  1.Identify water pollution, sources of pollution, physical and chemical characteristics  of sewage and their testing,  2.Ability to use principles of water/wastewater treatment and water quality control in  the natural systems,  3. Identify and explain the purpose of wastewater treatment, primary, secondary & tertiary treatment process sludge digestion and disinfection,  4. Ability to design of wastewater treatment plant.  5.Identify quality criteria for surface water, and   1. Ability to design of water treatment plant. | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A2. An ability to design a system, or components, or process to meet desired needs.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context.  . | |
| **B. The skills goals special to the course.**  B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **10.Teaching and Learning Methods** | |
| 1- Lectures  2- Tutorials  3- Homework and Assignments  4- Tests and Exams  5- In-Class Questions and Discussions  6- Connection between Theory and Application  7- Extracurricular Activities  8. Lab. examination  9- Seminars | |
| **11. 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) | |
| 12. **Grading Policy**   1. Term Tests 25 %. 2. Homework**,** 10% 3. Lab examination and report 15% 4. Final examination 50%   - The final exam will be comprehensive. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning. | |
| **Teaching and Learning Methods**  Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**  (other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility. | |
| **Teaching and Learning Methods**  Oral quizzes | |
| **Assessment methods**  Write reports | |

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| ***13. Course Structure*** | | | | | |
| Assessment Method | Teaching Method | Unit/ Module or Topic Title | LO’s  (Article 10) | Hours | Week |
| 1-4 of article(10) | 1-9 of article (9) | Introductory to water pollution | a,b,c | 4  2 theo  2 lab | 1 |
| 1-4 of article(10) | 1-9 of article (9) | Quality and characteristics of Municipal wastewater | a,b,c | 4  2 theo  2 lab | 2 |
| 1-4 of article(10) | 1-9 of article (9) | Biological oxidation of organic matter | a,b,c | 4  2 theo  2 lab | 3 |
| 1-4 of article(10) | 1-9 of article (9) | Biochemical Oxygen Demand (BOD) | a,b,c | 4  2 theo  2 lab | 4 |
| 1-4 of article(10) | 1-9 of article (9) | Biochemical Oxygen Demand (BOD) | a,b,c | 4  2 theo  2 lab | 5 |
| 1-4 of article(10) | 1-9 of article (9) | Chemical Oxygen Demand (COD) | a,b,c | 4  2 theo  2 lab | 6 |
| 1-4 of article(10) | 1-9 of article (9) | Decomposition of organic matter | a,b,c | 4  2 theo  2 lab | 7 |
| 1-4 of article(10) | 1-9 of article (9) | Treatment of sewage Preliminary treatment | a,b,c | 4  2 theo  2 lab | 8 |
| 1-4 of article(10) | 1-9 of article (9) | Primary Treatment | a,b,c | 4  2 theo  2 lab | 9 |
| 1-4 of article(10) | 1-9 of article (9) | Secondary Treatment | a,b,c | 4  2 theo  2 lab | 10 |
| 1-4 of article(10) | 1-9 of article (9) | Trickling Filter | a,b,c | 4  2 theo  2 lab | 11 |
| 1-4 of article(10) | 1-9 of article (9) | Activated Sludge Process | a,b,c | 4  2 theo  2 lab | 12 |
| 1-4 of article(10) | 1-9 of article (9) | Activated Sludge Process | a,b,c | 4  2 theo  2 lab | 13 |
| 1-4 of article(10) | 1-9 of article (9) | Sludge digestion Process | a,b,c | 4  2 theo  2 lab | 14 |
| 1-4 of article(10) | 1-9 of article (9) | Disposal of digested sludge | a,b,c | 4  2 theo  2 lab | 15 |
| 1-4 of article(10) | 1-9 of article (9) | Introduction to surface water quality | a,b,c | 4  2 theo  2 lab | 16 |
| 1-4 of article(10) | 1-9 of article (9) | Water quality standard | a,b,c | 4  2 theo  2 lab | 17 |
| 1-4 of article(10) | 1-9 of article (9) | Pollution effects on aquatic life | a,b,c | 4  2 theo  2 lab | 18 |
| 1-4 of article(10) | 1-9 of article (9) | Conventional water pollutants | a,b,c | 4  2 theo  2 lab | 19 |
| 1-4 of article(10) | 1-9 of article (9) | Toxic water pollutants | a,b,c | 4  2 theo  2 lab | 20 |
| 1-4 of article(10) | 1-9 of article (9) | Selection of water treatment process | a,b,c | 4  2 theo  2 lab | 21 |
| 1-4 of article(10) | 1-9 of article (9) | Types of treatment | a,b,c | 4  2 theo  2 lab | 22 |
| 1-4 of article(10) | 1-9 of article (9) | Screening | a,b,c | 4  2 theo  2 lab | 23 |
| 1-4 of article(10) | 1-9 of article (9) | Settling | a,b,c | 4  2 theo  2 lab | 24 |
| 1-4 of article(10) | 1-9 of article (9) | Settling | a,b,c | 4  2 theo  2 lab | 25 |
| 1-4 of article(10) | 1-9 of article (9) | Coagulation | a,b,c | 4  2 theo  2 lab | 26 |
| 1-4 of article(10) | 1-9 of article (9) | Flocculation | a,b,c | 4  2 theo  2 lab | 27 |
| 1-4 of article(10) | 1-9 of article (9) | Filtration | a,b,c | 4  2 theo  2 lab | 28 |
| 1-4 of article(10) | 1-9 of article (9) | Filtration | a,b,c | 4  2 theo  2 lab | 29 |
| 1-4 of article(10) | 1-9 of article (9) | Disinfection | a,b,c | 4  2 theo  2 lab | 30 |

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| **14. Infrastructure** |  |
| 1. Books Required reading: |  |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). | 1) T. H. Y. Tebbutt, (1997).Principles of water quality control. 5th Edition.  2) Warren Viessman Jr, Mark Hammer, Elizabeth Perez, Paul chadik. (2008). Water supply and pollution control. 8th Edition. |
| B-Electronic references, Internet  sites… |  |
| **15. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Human rights and democracy, 218 WRDF** |
| **4. Modes of Attendance offered** | 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-week regular subjects.. This subject given 2 hours theory for tow semester. There is no on-line subject which may be used as supplementary material for the class room ins. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hrs/2 hrs per week(first semester) and second semester) |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
|  | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1 .Encouraging the individual to contribute effectively to teamwork.  A2. Ability to define and maintain a creative/ innovative/effective problem –solving solution.. | |
| **B. The skills goals special to the course.** | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Homework and Assignments.  3. Tests and Exams.  4. In-Class Questions and Discussions.  5. Reports and presentations. | |
| **Assessment methods** | |
| 1.Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals** | |
| **Teaching and Learning Methods** | |
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| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development) | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-3 of article (12) | 1-8 of article (11) | Human rights in ancient civilizations | 2, 3 | 2 the.  .  . | 1 |
| 1-3 of article (12) | 1-8 of article (11) | Human rights in the heavenly laws | 2, 3 | 2 the.  . | 2 |
| 1-3 of article (12) | 1-8 of article (11) | Contemporary international recognition of human rights | 2, 3 | 2 the. | 3 |
| 1-3 of article (12) | 1-8 of article (11) | Human rights in the Universal Declaration and international covenants | 2, 3 | 2 the.  . | 4 |
| 1-3 of article (12) | 1-8 of article (11) | Regional conventions on human rights | 2, 3 | 2 the. | 5 |
| 1-3 of article (12) | 1-8 of article (11) | Human rights in national legislation / constitution | 2, 3 | 2 the. | 6 |
| 1-3 of article (12) | 1-8 of article (11) | Non-governmental organizations | 2, 3 | 2 the.  . | 7 |
| 1-3 of article (12) | 1-8 of article (11) | Generations of human rights | 2, 3 | 2 the. | 8 |
| 1-3 of article (12) | 1-8 of article (11) | Interdependence between generations of human rights | 2, 3 | 2 the. | 9 |
| 1-3 of article (12) | 1-8 of article (11) | Guarantees of constitutional and judicial human rights | 2, 3 | 2 the.  . | 10 |
| 1-3 of article (12) | 1-8 of article (11) | Political guarantees and the role of non –governmental organizations | 2, 3 | 2 the. | 11 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Dr. Riyadh Aziz Hadi ,human rights,their development,contents,protection,The Legal Library,Baghdad, |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **English Language II , 219WREN** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures are provided to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 15 hrs, 1 hr per week (first semester)  15 hrs, 1 hr per week (second semester) |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to empower students with the language and life skills they need to carry out their goals. To this end it provides ample opportunities for students to build awareness and practice language in real- life scenarios. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  By the end of this communication skills course, the students will be able to:  1- Find and understand information about vocabulary, pronunciation, usage, and grammar in reference texts, online resources, and English language dictionaries.  2- Develop conversational English skills necessary for becoming a contributing participant in small group activities, large group discussions, and oral presentations.  3- Understand texts using effective learning strategies for reading and vocabulary building.  4- Demonstrate an appropriate level of control of grammatical accuracy and lexical appropriacy in written and oral communication. | |
| 1. **Cognitive goals** | |
| **B. The skills goals special to the course.** | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Homework and Assignments.  3. Tests and Exams.  4. In-Class Questions and Discussions.  5. Reports and Presentations. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals** | |
| **Teaching and Learning Methods** | |
| **Assessment methods** | |
|  | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 3 of article (12) | 1-5 of  article (11) | Introduction to the course | 1 | 1 hr | 1 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: Getting to know you | 2 | 1 hr | 2 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: Getting to know you | 3 | 1 hr | 3 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: The way we live | 4 | 1 hr | 4 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: The way we live | 5 | 1 hr | 5 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: It all went wrong | 6 | 1 hr | 6 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: It all went wrong | 7 | 1 hr | 7 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Let's go shopping! | 8 | 1 hr | 8 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Let's go shopping! | 9 | 1 hr | 9 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: What do you want to do? | 10 | 1 hr | 10 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: What do you want to do? | 11 | 1 hr | 11 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: Tell me! What's it like? | 12 | 1 hr | 12 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: Tell me! What's it like? | 13 | 1 hr | 13 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Fame | 14 | 1 hr | 14 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Fame | 15 | 1 hr | 15 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: Do's and don'ts | 16 | 1 hr | 16 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: Do's and don'ts | 17 | 1 hr | 17 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: Going Places | 18 | 1 hr | 18 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: Going Places | 19 | 1 hr | 19 |
| 1 – 3 of article (12) | 11-5 of  article (11) | Unit 10: Scared to death | 20 | 1 hr | 20 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 10: Scared to death | 21 | 1 hr | 21 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Things that changed the world | 22 | 1 hr | 22 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Things that changed the world | 23 | 1 hr | 23 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Things that changed the world | 24 | 1 hr | 24 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Dreams and reality | 25 | 1 hr | 25 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Dreams and reality | 26 | 1 hr | 26 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Earning a living | 27 | 1 hr | 27 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Earning a living | 28 | 1 hr | 28 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 14: Family ties | 29 | 1 hr | 29 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 14: Family ties | 30 | 1 hr | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | (1) New Headway Plus (Pre-intermediate] by John and Liz Soars, Oxford: Oxford University Press (2006) |
| 2. Main references (sources) | **References**  (1) Modern scientific articles from the news related to the students' specialty  ***Others***   * Notebook prepared by the instructor of the   course   * Collection of sheets of solved and unsolved * problems and Exams questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Computer , 220WRCO** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aims of this course are to develop skilled Excel and Internet users with the technical background, knowledge, and adaptability to develop well-designed, robust, computer-based solutions to a range of problems. The course introduces students to Microsoft office excel and Internet | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  Microsoft Excel  Examine spreadsheet concepts and explore the Microsoft Office Excel environment.  Create, open and view a workbook.  Save and print workbooks.  Enter and edit data.  Modify a worksheet and workbook.  Work with cell references.  Learn to use functions and formulas.  Create and edit charts and graphics.  Filter and sort table data.  Work with pivot tables and charts.  Import and export data.  Work with Cells and Worksheets  Calculate Your Data  Format your Workbook  Add Charts and Graphics  Collaborate with Others  Data analysis Using Lookup Formulas and Formula Auditing  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | Internet Skills | | Using a Web Browser | | What is a URL and recognizing it. | | Understanding terms such as ISP, website, home page and search engine | | Using the button bar to navigate through web sites | | Creating a bookmark/Saving a website as a favorite link | | Locating and using links on a website | | Using a search engine to location information on the Internet | | Printing from the Internet | | | |
| 1. **Cognitive goals**   A1. An ability to design solutions by using Excel tools  A2. The acknowledgment needed perform data analysis  A3. Acquiring the Knowledge to use the Internet Effectively  A4. To learn how to use the data and procedures and download them from the internet | |
| **B. The skills goals special to the course.**  B1. The skill of working with websites and search engines  B3. The Use of Excel and internet program to write scientific assays and reports.  B4. A professional user that can deal with different types of mathematical and logical problems via the usage of excel and internet | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1-Examination, tests, and quizzes  2-Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. Gain an understaning of how to use a browser to access the Internet, enter an internet address  (URL), save favorite sites, and use a search tool to find information on the internet.  C3. Ability to function effectively as an individual in a group.  C4. Have the advanced skills developed for the use of office productivity packages | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Introduction to Excel | 1 | 2 | 1 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | |  | | --- | | Define and identify cells | | 2 , 3 | 2 | 2 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Identify each command tab on the ribbon and the command groups for each tab | 3 , 4 | 2 | 3 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Enter data into a worksheet | 4 | 2 | 4 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Data format | 5 | 2 | 5 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Cells format | 5 | 2 | 6 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Table format | 6 | 2 | 7 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | List components of a formula | 6 | 2 | 8 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Apply filters and sort | 7 | 2 | 9 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Create pivot tables | 7 , 8 | 2 | 10 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Apply Excel to common household applications | 7,8 | 2 | 11 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Using If | 9, 10 | 2 | 12 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | The use of nest IF | 9, 10 | 2 | 13 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Apply conditional formatting | 9,10 | 2 | 14 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | Analyze data what If | 6 | 2 | 15 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Introduction to computer netwrks** | 11 | 2 | 16 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Networks components** | 11 | 2 | 17 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Types of networks** | 12 | 2 | 18 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **WWW.** | 12 | 2 | 19 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Internet protocols** | 13 | 2 | 20 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Cloud computing** | 13 | 2 | 21 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Web browsing** | 15 | 2 | 22 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Search engines** | 15 | 2 | 23 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Advance search** | 15 | 2 | 24 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **E-mails** | 15 | 2 | 25 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Microsoft outlook** | 15 | 2 | 26 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Social Media-1** | 16 | 2 | 27 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Negative effects of Internet usage** | 16 | 2 | 28 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Technology ethics** | 17 | 2 | 29 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Data and computer security** | 17, 18 | 2 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Textbook  Ghassan Hamid Abdul Majed , (2014) "Computer Fundamentals" Book store for printing publishing and translating . |
| 2. Main references (sources) | IC3 Test Guide (2019) . Certiport.   * MOS study guide 2013 Exam (77-420) .Pearson education |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Hydrology /319WRHY** |
| **4. Modes of Attendance offered** | 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-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
|  | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Hydrologic cycle and measurement of precipitation 2. Estimating of missing precipitation and double-mass analysis 3. Average precipitation over area and measurements of snow 4. Stream flow and stage 5. Discharge measurement 6. Stage –discharge relations and units 7. Evaporation 8. Characteristic of hydrograph 9. Stream flow recessions 10. Hydrograph separation 11. Unit hydrograph 12. Derivation of unit hydrograph 13. S-curve 14. Synthetic unit hydrograph 15. Rational method 16. Rainfall runoff relation and infiltration capacity 17. Infiltration index 18. Stream flow routing and wave movement 19. Abrupt wave 20. Storage equation and routing in a river channels 21. Muskingum method 22. Reservoir routing 23. Graphical method 24. Probability and plotting positions 25. Gumbel distribution and log- pearson type III disribution | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions.  6. Connection between Theory and Application.  7. Extracurricular Activities. | |
| **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 ). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams | |
| **Assessment methods** | |
| 1-Examination, tests, seminars and quizzes  2-Student engagement during lectures | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-7 of article (11) | Hydrologic cycle and measurement of precipitation | 1 | 3  2 the.  1 tut. | 1 |
| 1 – 4 of article (12) | 1-7 of article (11) | Estimating of missing precipitation and double-mass analysis | 2 | 3  2 the.  1 tut. | 2 |
| 1 – 4 of article (12) | 1-7 of article (11) | Average precipitation over area and measurements of snow | 3 | 3  2 the.  1 tut. | 3 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stream flow and stage | 4 | 3  2 the.  1 tut. | 4 |
| 1 – 4 of article (12) | 1-7 of article (11) | Discharge measurement | 5 | 3  2 the.  1 tut. | 5 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stage-discharge relations and units | 6 | 3  2 the.  1 tut. | 6 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stage-discharge relations and units | 6 | 3  2 the.  1 tut. | 7 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stage –discharge relations and units | 6 | 3  2 the.  1 tut. | 8 |
| 1 – 4 of article (12) | 1-7 of article (11) | evaporation | 7 | 3  2 the.  1 tut. | 9 |
| 1 – 4 of article (12) | 1-7 of article (11) | Characteristic of hydrograph | 8 | 3  2 the.  1 tut. | 10 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stream flow recessions | 9 | 3  2 the.  1 tut. | 11 |
| 1 – 4 of article (12) | 1-7 of article (11) | Hydrograph separation | 10 | 3  2 the.  1 tut. | 12 |
| 1 – 4 of article (12) | 1-7 of article (11) | Hydrograph separation | 10 | 3  2 the.  1 tut. | 13 |
| 1 – 4 of article (12) | 1-7 of article (11) | Unit hydrograph | 11 | 3  2 the.  1 tut. | 14 |
| 1 – 4 of article (12) | 1-7 of article (11) | Derivation of unit hydrograph | 12 | 3  2 the.  1 tut. | 15 |
| 1 – 4 of article (12) | 1-7 of article (11) | S-curve | 13 | 3  2 the.  1 tut. | 16 |
| 1 – 4 of article (12) | 1-7 of article (11) | Synthetic unit hydrograph | 14 | 3  2 the.  1 tut. | 17 |
| 1 – 4 of article (12) | 1-7 of article (11) | Rational method | 15 | 3  2 the.  1 tut. | 18 |
| 1 – 4 of article (12) | 1-7 of article (11) | Rational method |  | 3  2 the.  1 tut. | 19 |
| 1 – 4 of article (12) | 1-7 of article (11) | Rainfall runoff relation and infiltration capacity | 16 | 3  2 the.  1 tut. | 20 |
| 1 – 4 of article (12) | 1-7 of article (11) | Infiltration index | 17 | 3  2 the.  1 tut. | 21 |
| 1 – 4 of article (12) | 1-7 of article (11) | Stream flow routing and wave movement | 18 | 3  2 the.  1 tut. | 22 |
| 1 – 4 of article (12) | 1-7 of article (11) | Abrupt wave | 19 | 3  2 the.  1 tut. | 23 |
| 1 – 4 of article (12) | 1-7 of article (11) | Storage equation and routing in a river channels | 20 | 3  2 the.  1 tut. | 24 |
| 1 – 4 of article (12) | 1-7 of article (11) | Muskingum method | 21 | 3  2 the.  1 tut. | 25 |
| 1 – 4 of article (12) | 1-7 of article (11) | Reservoir routing | 22 | 3  2 the.  1 tut. | 26 |
| 1 – 4 of article (12) | 1-7 of article (11) | Reservoir routing | 22 | 3  2 the.  1 tut. | 27 |
| 1 – 4 of article (12) | 1-7 of article (11) | Graphical method | 23 | 3  2 the.  1 tut. | 28 |
| 1 – 4 of article (12) | 1-7 of article (11) | Probability and plotting positions | 24 | 3  2 the.  1 tut. | 29 |
| 1 – 4 of article (12) | 1-7 of article (11) | Gumbel distribution and log- pearson type III disribution | 25 | 3  2 the.  1 tut. | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Hydrology for engineers Ray K. Linsley, Max Adam Kohler. |
| 2. Main references (sources) | * Applied hydrology by Chow Maidment Mays. * Hydrology and flood plain analysis. * Hydrology in practice Elizabeth M. Show |
| A- Recommended books and references scientific journals, reports…). | **Others**  1. Notebook prepared by the instructor of the course  2. Collection of sheets of solved and unsolved problems and Exams questions |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| Review the coarse syllabus after two years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Soil Mechanics and Foundation Design/ 320 WRSM** |
| **4. Modes of Attendance offered** | 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-week regular subjects. This subject given 2 hours theory, 2 hour tutorial, and 2 hour lab work per week. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 180 hr., 6 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1- Defining soil and providing basic definitions and introductory concepts to soil mechanics  2. Explain how to describe the soil, soil phases and gradient.  3. Explain the main principles of soil classification.  4. Explain the flow of water through the soil.  5- Explain the one-way flow in the soil.  6. Explanation of the two-way flow network.  7. Explain the stresses in the soil.  8. Explain the pressures that occurred due to external loads and geostatic pressures.  9. Moore Circle Explained.  10. Explanation of compressibility.  11. Consolidation.  12. Explain soil resistance.  13. Explanation of bearing capacity and type of settlement.  14. Explain the stresses resulting from the retaining wall (solid or flexible wall).  15. Evidence of slopes.  16- Provide basic definitions and introductory concepts for foundation design.  17. Design of individual foundations.  18. Design of strip foundation and foundations. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Reports and presentations. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| In-Class Questions and Discussions. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty. | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-3 of article (11) | 1-7 of article (10) | Introduction and soil formation | A, B,C,D | 6 | 1 |
| 1-3 of article (11) | 1-8 of article (10) | Phase relationship | A, B,C,D | 6 | 2 |
| 1-3 of article (11) | 1-8 of article (10) | Their derivations | A, B,C,D | 6 | 3 |
| 1-3 of article (11) | 1-8 of article (10) | Soil identification test | A, B,C,D | 6 | 4 |
| 1-3 of article (11) | 1-8 of article (10) | Calculation of the phase relation | A, B,C,D | 6 | 5 |
| 1-3 of article (11) | 1-8 of article (10) | Compaction | A, B,C,D | 6 | 6 |
| 1-3 of article (11) | 1-8 of article (10) | Soil classification | A, B,C,D | 6 | 7 |
| 1-3 of article (11) | 1-8 of article (10) | Stress within soil mass | A, B,C,D | 6 | 8 |
| 1-3 of article (11) | 1-8 of article (10) | Mohr circle and principle stress | A, B,C,D | 6 | 9 |
| 1-3 of article (11) | 1-8 of article (10) | Theory of one dimensional flow | A, B,C,D | 6 | 10 |
| 1-3 of article (11) | 1-8 of article (10) | Calculation of one dimensional flow | A, B,C,D | 6 | 11 |
| 1-3 of article (11) | 1-8 of article (10) | Two dimensional flow | A, B,C,D | 6 | 12 |
| 1-3 of article (11) | 1-8 of article (10) | Shear strength of soil | A, B,C,D | 6 | 13 |
| 1-3 of article (11) | 1-8 of article (10) | Compressibility of soils | A, B,C,D | 6 | 14 |
| 1-3 of article (11) | 1-8 of article (10) | Theory of settlement | A, B,C,D | 6 | 15 |
| 1-3 of article (11) | 1-8 of article (10) | Their application | A, B,C,D | 6 | 16 |
| 1-3 of article (11) | 1-8 of article (10) | Consolidation theory | A, B,C,D | 6 | 17 |
| 1-3 of article (11) | 1-8 of article (10) | Their application | A, B,C,D | 6 | 18 |
| 1-3 of article (11) | 1-8 of article (10) | Lateral earth pressure | A, B,C,D | 6 | 19 |
| 1-3 of article (11) | 1-8 of article (10) | Types of earth pressure | A, B,C,D | 6 | 20 |
| 1-3 of article (11) | 1-8 of article (10) | Types of retaining wall | A, B,C,D | 6 | 21 |
| 1-3 of article (11) | 1-8 of article (10) | Analysis of rigid retaining wall | A, B,C,D | 6 | 22 |
| 1-3 of article (11) | 1-8 of article (10) | Analysis of flexible retaining wall | A, B,C,D | 6 | 23 |
| 1-3 of article (11) | 1-8 of article (10) | Sheet piles | A, B,C,D | 6 | 24 |
| 1-3 of article (11) | 1-8 of article (10) | Slope stability analysis | A, B,C,D | 6 | 25 |
| 1-3 of article (11) | 1-8 of article (10) | Bearing capacity analysis | A, B,C,D | 6 | 26 |
| 1-3 of article (11) | 1-8 of article (10) | Shallow foundation design | A, B,C,D | 6 | 27 |
| 1-3 of article (11) | 1-8 of article (10) | Spread footing design | A, B,C,D | 6 | 28 |
| 1-3 of article (11) | 1-8 of article (10) | Combined footing design | A, B,C,D | 6 | 29 |
| 1-3 of article (11) | 1-8 of article (10) | Revision | A, B,C,D | 6 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Soil Mechanics, Si version by (T. William Lmbe and Robert V. Whitman) |
| 2. Main references (sources) | 1-Foundation Analysis and Design , Bowles,1998  2-Principles of Geotechnical Engineering, Das, B.M, 2002   * 3- كتاب هندسة الاسس للدكتور يوسف الشكرجي |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Irrigation principles / 321 WRIE** |
| **4. Modes of Attendance offered** | 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. With an alternative using online lectures have been providing to the students using Google Classroom Application.  The academic year is composed of 30-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1.Introduce basic definitions and introductory concepts of irrigation.  2. Introduce the description of soil physical properties, available water, field capacity, permanent wilting point and readily available water.  3. Introduce the description of soil moisture content, methods of measuring and calculations.  4. Explain and description of net applied depth, gross depth of irrigation, application and irrigation efficiency and conveyance irrigation.  5.Introduce the principles of evapotranspiration, reference evapotranspiration, crop or actual evapotranspiration and crop coefficient.  6. Description of irrigation interval and the maximum value.  7. Introduce the principles of relation between discharges, time of irrigation, depth applied and field area.  8. Difference between continuous and intermittent irrigation operations.  9. Description the principle of water balance and budget and to learn the procedure of schedule of irrigation and methods used.  10- Explain the principle of infiltration process, rate of infiltration and basic infiltration.  11- Description the basic and important of land leveling and grading, introducing the principle of levelling, methods of calculating the required land slope and methods used for calculating the volume of cut and fill | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Define soil moisture calculation, readily available, and soil moisture deficit. 2. Relation between depth of soil, depth of water and soil moisture content. 3. Calculate; required net depth of irrigation, gross depth of irrigation, application and irrigation efficiencies, conveyance efficiencies in the canals, and the required total water applied to the head of the canal. 4. Calculate; the reference evapotranspiration according to different methods, how to use the weather parameters and applied in the different methods. And define the crop coefficients for the plants. Additional to know how to calculate crop or actual evapotranspiration. 5. Define the irrigation intervals and the maximum irrigation intervals. 6. Calculate; the discharge applied to the field (farm) according to the applied depth of water, time of irrigation and the field area. 7. Understand and apply the calculated discharge in the operation of irrigation, continuous and intermittent discharge. 8. Formulate and solve the water duty according to the continuous discharge and the field area. 9. Calculate and managed the schedule of irrigation by using two methods, and calculate the water budget. And define the difference between the two methods. 10. Define and calculate the infiltration, infiltration rate, instantaneous infiltration rate and basic infiltration rate. Additional how to use the log-log paper, and the least squares method to define the equation. 11. Calculate; the land grading, longitudinal and horizontal slopes, cut and fill ratio, adjusting the plane of the land, and then calculation of volume of fill and cut by using different methods. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Connection between Theory and Application.  8. Extracurricular Activities | |
| **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). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures  2. Tutorials  3. Home works  4. Test and exams  5. In class questions and discussions | |
| **Assessment methods** | |
| 1. Examinations, Tests and Quizzes  2. Extracurricular activities  3. Student engagement during lectures | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 | 1-8 | Introduction to the Basic Soil -Plant -Water Relations. | 1 | 3  2 the.  1 tut. | 1 |
| 1 – 4 | 1-8 | Soil Texture (type of soils). | 1 | 3  2 the.  1 tut. | 2 |
| 1 – 4 | 1-8 | Soil moisture content. | 1 | 3  2 the.  1 tut. | 3 |
| 1 – 4 | 1-8 | Available water, soil moisture deficit, and readily available water. | 1 | 3  2 the.  1 tut. | 4 |
| 1 – 4 | 1-8 | Relation between depth of soil, depth of water and soil moisture content. | 2 | 3  2 the.  1 tut. | 5 |
| 1 – 4 | 1-8 | Plant consumptive use. and crop coefficient. | 3 | 3  2 the.  1 tut. | 6 |
| 1 – 4 | 1-8 | Net depth of water and leaching requirements. | 1-4 | 3  2 the.  1 tut. | 7 |
| 1 – 4 | 1-8 | Gross depth of water. | 1-4 | 3  2 the.  1 tut. | 8 |
| 1 – 4 | 1-8 | Irrigation interval and maximum irrigation interval. | 1-5 | 3  2 the.  1 tut. | 9 |
| 1 – 4 | 1-8 | Irrigation efficiency. | 1-5 | 3  2 the.  1 tut. | 10 |
| 1 – 4 | 1-8 | Conveyance efficiency. | 1-5 | 3  2 the.  1 tut. | 11 |
| 1 – 4 | 1-8 | Relation between discharge, depth, area, and time. | 1-6 | 3  2 the.  1 tut. | 12 |
| 1 – 4 | 1-8 | Relation between discharge, depth, area, and time. | 1-6 | 3  2 the.  1 tut. | 13 |
| 1 – 4 | 1-8 | Continues and intermittent operations. | 1-7 | 3  2 the.  1 tut. | 14 |
| 1 – 4 | 1-8 | Water duty. | 1-8 | 3  2 the.  1 tut. | 15 |
| 1 – 4 | 1-8 | Water balance (1). | 1-9 | 3  2 the.  1 tut. | 16 |
| 1 – 4 | 1-8 | Water balance (2). | 1-9 | 3  2 the.  1 tut. | 17 |
| 1 – 4 | 1-8 | Water requirements. | 1-9 | 3  2 the.  1 tut. | 18 |
| 1 – 4 | 1-8 | Project water requirement. | 1-9 | 3  2 the.  1 tut. | 19 |
| 1 – 4 | 1-8 | Irrigation scheduling (constant net depth method). | 1-9 | 3  2 the.  1 tut. | 20 |
| 1 – 4 | 1-8 | Irrigation scheduling (constant net depth method). | 1-9 | 3  2 the.  1 tut. | 21 |
| 1 – 4 | 1-8 | Irrigation scheduling (constant irrigation interval method). | 1-9 | 3  2 the.  1 tut. | 22 |
| 1 – 4 | 1-8 | Irrigation scheduling (constant irrigation interval method). | 1-9 | 3  2 the.  1 tut. | 23 |
| 1 – 4 | 1-8 | Soil infiltration. | 10 | 3  2 the.  1 tut.  . | 24 |
| 1 – 4 | 1-8 | Infiltration rate. | 10 | 3  2 the.  1 tut. | 25 |
| 1 – 4 | 1-8 | Instantaneous infiltration rate | 10 | 3  2 the.  1 tut.  . | 26 |
| 1 – 4 | 1-8 | Basic infiltration rate. | 10 | 3  2 the.  1 tut. | 27 |
| 1 – 4 | 1-8 | Land grading. | 11 | 3  2 the.  1 tut.  . | 28 |
| 1 – 4 | 1-8 | Land grading. | 11 | 3  2 the.  1 tut. | 29 |
| 1 – 4 | 1-8 | Volume of earth work | 11 | 3  2 the.  1 tut.  . | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | “Irrigation Principle and Practice” by Israel Sen |
| 2. Main references (sources) | * Note book from web-site * “Irrigation Engineering” by R. K. Sharma |
| A- Recommended books and references scientific journals, reports…). | Others  1. Notebook prepared by the instructor of the course  2. Collection of sheets of solved and  unsolved problems and Exams  question |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| A Reviewing of the coarse details after 4 years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Irrigation and Drainage Networks, 322 WRID** |
| **4. Modes of Attendance offered** | One time, day time on campus |
| **5. Semester/Year** | 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours’ tuition (total)** | 45 hrs (3 hrs per week) |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| This course introduces the description of design Irrigation and Drainage Networks. Topics covered: Types of Irrigation and Drainage Networks, Components, and Functions. Layout of Irrigation and Drainage Networks, Calculation of Discharge for Canals and Drains, Design of Water Course and Farm Channel (Slope), Design of Collector Drain (Slope), Determine the Water Level in Irrigation Canals, Determine the Water Level in Drains, Hydraulic Design of Canal Cross Section, the longitudinal section and synoptic diagram and Canals Lining | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of Irrigation and Drainage Networks will be able to:   1. Understand and define irrigation and drainage networks. 2. Layout of irrigation and drainage networks. 3. Calculation of discharge for canals and drains. 4. Design of water course and farm channel (slope) 5. Design of collector drain and main collector drain (slope). 6. Determine the water level in irrigation canals and slopes. 7. Determine the water Level in drains and slopes. 8. Design requires the use of steady uniform flow equation such as. Manning’s and Chezy’s formula. 9. Design by empirical methods 10. Design by best hydraulic section methods. 11. Design by Regime canals. 12. Draw the longitudinal section and synoptic diagram. 13. Understand the canal lining. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures 2. Tutorials 3. Homework 4. In class Questions and Discussions 5. Exams | |
| **Assessment methods** | |
| 1. Examination and Quizzes 2. Student Engagement during Lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| * lectures, * tutorials, and * supervised team work. | |
| **Assessment methods** | |
| * homework**,** * quizzes, * major examination during the course, and * final examination. | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-2 of article (12) | 1-8 of article (11) | Irrigation Network.  Drainage Network. | 1 | 3 | 16 |
| 1-2 of article (12) | 1-8 of article (11) | Comparison between Irrigation and Drainage Networks.  Names and Numbers of Canals and Drains. | 1 | 3 | 17 |
| 1-2 of article (12) | 1-8 of article (11) | Layout of Irrigation and Drainage Networks. | 1-2 | 3 | 18 |
| 1-2 of article (12) | 1-8 of article (11) | Irrigation Unit.  Water Duty.  Drainage Coefficient | 3 | 3 | 19 |
| 1-2 of article (12) | 1-8 of article (11) | Calculation of Discharge for Canals and Drains. | 3 | 3 | 20 |
| 1-2 of article (12) | 1-8 of article (11) | Design of Water Course and Farm Channel (Slope). | 4 | 3 | 21 |
| 1-2 of article (12) | 1-8 of article (11) | Design of Collector Drain (Slope). | 5 | 3 | 22 |
| 1-2 of article (12) | 1-8 of article (11) | Determine the Water Level along the Main, Lateral, and Distributory Canal. | 6 | 3 | 23 |
| 1-2 of article (12) | 1-8 of article (11) | Determine the Water Level along the Main, and Main Collector Drain. | 7 | 3 | 24 |
| 1-2 of article (12) | 1-8 of article (11) | Hydraulic Design of Canal Section by using  (Manning’s Formula and Chezy’s Formula). | 8 | 3 | 25 |
| 1-2 of article (12) | 1-8 of article (11) | Hydraulic Design of Canal Section by using Empirical Methods. | 8-9 | 3 | 26 |
| 1-2 of article (12) | 1-8 of article (11) | Hydraulic Design of Canal Section by using Best Hydraulic Section Methods. | 8-10 | 3 | 27 |
| 1-2 of article (12) | 1-8 of article (11) | Hydraulic Design of Canal Section by using Regime Canals. | 11 | 3 | 28 |
| 1-2 of article (12) | 1-8 of article (11) | Longitudinal Section and Synoptic Diagram for Irrigation and Drainage canals . | 3-4-5-6-7-12 | 3 | 29 |
| 1-2 of article (12) | 1-8 of article (11) | Lining of Canals. | 13 | 3 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: |  |
| 2. Main references (sources) | References  Design Manual for Irrigation and Drainage / Pencol 1983.   * Others |
| A- Recommended books and references scientific journals, reports…). | • Notebook Prepared by the Instructor.  Collection of Sheets of Solved and Unsolved |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Fluid Mechanics / 323 WRFM** |
| **4. Modes of Attendance offered** | 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. With an alternative using online lectures have been providing to the students using Google Classroom Application.  The academic year is composed of 30-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 150 hr., 5 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Definitions and introductory concepts of fluid mechanics.  2. Introduce the description of pressure distribution in a static fluid and its effects on submerged surfaces and bodies.  3. Introduce the description of phenomena associated with fluid flow phenomena.  4. Explain and derive the conservation laws that govern fluid motion (continuity, energy, and momentum equations).  5. Introduce the principles of “Dimensional Analysis” and “Similitude” and their application to fluid mechanics problems.  6. Introduction to fluid flow in pipes, smooth and rough pipes, laminar and turbulent flow, computation of major and minor losses in pipes.  7. Enable the student to analyze and design pipes network and pumps connection.  8. Enable the student to measure the fluid properties and flow parameters.  9. Provide a good physical and analytical understanding of fluid flows.  10. Provide a background to higher level courses involving open channel and advance hydrodynamic flow.engineering. The students will be familiar with the applications in this field of engineering that can be addressed using linear and nonlinear optimization. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Define Fluids and Fluid Mechanics and distinguish between incompressible and compressible fluids, and understand and define the basic fluid properties; especially density and viscosity, and apply Newton’s law of viscosity. 2. Calculate; the pressure in static fluid, hydrostatic forces on submerged surfaces, buoyancy forces, stability of submerged and floating bodies, and forces on accelerated fluids.   3. Be familiar with continuity, energy, and momentum equations, and their applications to fluid flow problems.  4. Understand and apply the principles of dimensional analysis and similitude to fluid mechanics problems.  5. Estimate drag and lift forces in laminar and turbulent flows for different immersed bodies.  6. Calculate frictional losses in pipe problems for both laminar and turbulent flows, by using Moody Diagram.  7. Calculate secondary (minor) losses for various pipes fittings and connections.  8. Know how to measure flow properties (pressure, velocity, and discharge) and fluid properties (density and viscosity).  9. Be able to analyze and design pipes network and connection, and pumping stations and connection.  10. Be able to use dimensional analysis to similitude different engineering problems.  11. Identify, formulate and solve engineering fluid problems.  12. Use the techniques, skills, and modern engineering tools necessary for engineering practice in fluid mechanics applications. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Connection between Theory and Application.  8. Extracurricular Activities | |
| **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). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures  2. Tutorials  3. Home works  4. Test and exams  5. In class questions and discussions | |
| **Assessment methods** | |
| 1. Examinations, Tests and Quizzes  2. Extracurricular activities  3. Student engagement during lectures | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-8 of article (11) | Introduction& Fluid properties, Fluid State | 1,2 | 5  3 the.  1 tut.  1 exp. | 1 |
| 1 – 4 of article (12) | 1-8 of article (11) | Density, Weight density, Specific Volume, Relative Density | 1,2 | 5  3 the.  1 tut.  1 exp. | 2 |
| 1 – 4 of article (12) | 1-8 of article (11) | Compressibility, Elasticity, Viscosity | 1,2 | 5  3 the.  1 tut.  1 exp. | 3 |
| 1 – 4 of article (12) | 1-8 of article (11) | Surface Tension, Vapor Pressure | 1,2 | 5  3 the.  1 tut.  1 exp. | 4 |
| 1 – 4 of article (12) | 1-8 of article (11) | Pressure-Density-Height Relationships | 1,2 | 5  3 the.  1 tut.  1 exp. | 5 |
| 1 – 4 of article (12) | 1-8 of article (11) | Absolute and Gage Pressures, Manometry | 1,2 | 5  3 the.  1 tut.  1 exp. | 6 |
| 1 – 4 of article (12) | 1-8 of article (11) | Forces on Submerged Surfaces | 1,2 | 5  3 the.  1 tut.  1 exp. | 7 |
| 1 – 4 of article (12) | 1-8 of article (11) | Buoyancy and Flotation | 1,2 | 5  3 the.  1 tut.  1 exp. | 8 |
| 1 – 4 of article (12) | 1-8 of article (11) | Fluid Masses Subjected to Acceleration | 1,2 | 5  3 the.  1 tut.  1 exp. | 9 |
| 1 – 4 of article (12) | 1-8 of article (11) | Kinematics of Fluid Motion | 1,2 | 5  3 the.  1 tut.  1 exp. | 10 |
| 1 – 4 of article (12) | 1-8 of article (11) | Continuity Equation | 1,2,3 | 5  3 the.  1 tut.  1 exp. | 11 |
| 1 – 4 of article (12) | 1-8 of article (11) | Ideal Flow, Bernoulli Equation | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 12 |
| 1 – 4 of article (12) | 1-8 of article (11) | Application of Bernoulli equation | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 13 |
| 1 – 4 of article (12) | 1-8 of article (11) | Momentum Equation | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 14 |
| 1 – 4 of article (12) | 1-8 of article (11) | Application of Momentum Equation, Hydraulic Jump | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 15 |
| 1 – 4 of article (12) | 1-8 of article (11) | Flow of a Real Fluid | 1,2 | 5  3 the.  1 tut.  1 exp. | 16 |
| 1 – 4 of article (12) | 1-8 of article (11) | Laminar and Turbulent Flow, Eddy Viscosity | 1,2 | 5  3 the.  1 tut.  1 exp. | 17 |
| 1 – 4 of article (12) | 1-8 of article (11) | The Energy Equation, Resistance Force and Energy Dissipation | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 18 |
| 1 – 4 of article (12) | 1-8 of article (11) | Similitude and Dimensional Analysis | 1,2 | 5  3 the.  1 tut.  1 exp. | 19 |
| 1 – 4 of article (12) | 1-8 of article (11) | Similitude and Models, Geometric, kinematic, Dynamic Similarity | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 20 |
| 1 – 4 of article (12) | 1-8 of article (11) | Principle of Dimensional Homogeneity, Buckingham Π-Theorem | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 21 |
| 1 – 4 of article (12) | 1-8 of article (11) | Fluid Flow in Pipes | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 22 |
| 1 – 4 of article (12) | 1-8 of article (11) | Incompressible Flow, Laminar Flow | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 23 |
| 1 – 4 of article (12) | 1-8 of article (11) | Turbulent Flow-Smooth pipes, Rough pipes | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 24 |
| 1 – 4 of article (12) | 1-8 of article (11) | Pipe Friction Factors, Classification of Smoothness and Roughness | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 25 |
| 1 – 4 of article (12) | 1-8 of article (11) | Pipe Friction-An Empirical Formulation, Minor Losses in Pipelines | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 26 |
| 1 – 4 of article (12) | 1-8 of article (11) | Pipeline Problems-Single and multiple pipes | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 27 |
| 1 – 4 of article (12) | 1-8 of article (11) | Open channel flow, Normal depth, critical depth computation | 1,2,3,4 | 5  3 the.  1 tut.  1 exp. | 28 |
| 1 – 4 of article (12) | 1-8 of article (11) | Specific energy curve , momentum principle | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 29 |
| 1 – 4 of article (12) | 1-8 of article (11) | Hydraulic jump, best hydraulic section | 1 - 10 | 5  3 the.  1 tut.  1 exp. | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Elementary fluid mechanics J.K. Vennard &R.L. Street |
| 2. Main references (sources) | References  Fluid mechanics by R.K. RAJPUT, ISO 9001;2000  Fluid mechanics by A.K. mohanty, New Delhi-110001;2009  Fluid mechanics by Young, Munson, Okiishi, Huebsch |
| A- Recommended books and references scientific journals, reports…). | Others  1. Notebook prepared by the instructor of the course  2. Collection of sheets of solved and  unsolved problems and Exams  question |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| A Reviewing of the coarse details after 4 years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Structural Analysis, 324 WRSA** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. Online lectures have been provided to the students using google classroom application. |
| **5. Semester/Year** | 1st Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 4 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
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| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. introduce the students about the structure’s equilibrium 2. Teach the students how to calculate the stresses and moment for determinate structures and draw the shear and moment diagrams. 3. Teach the students how to calculate the stresses and moment for indeterminate structures and draw the shear and moment diagrams, using different analysis methods such as: 4. Slope Deflection Method 5. Moment Distribution Method 6. Force Method | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1.Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions.  6. Connection between Theory and Application. | |
| **Assessment methods** | |
| 1. Examinations and Quizzes.  2. Student Engagement during Lectures. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group. | |
| **Teaching and Learning Methods** | |
| Discussion with students  Oral quizzes | |
| **Assessment methods** | |
| * Respecting deadlines * Write reports | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1, 2, 3 | 1, 2, 3 | Types of structures and loads | 1 | 4 | 1 |
| 1, 2, 3 | 1, 2, 3 | Structure classification, stability | 1 | 4 | 2 |
| 1, 2, 3 | 1, 2, 3 | Analysis of statically determinate structures trusses | 1 | 4 | 3 |
| 1, 2, 3 | 1, 2, 3 | Analysis of statically determinate structures beams | 1 | 4 | 4 |
| 1, 2, 3 | 1, 2, 3 | Analysis of statically determinate structures | 1 | 4 | 5 |
| 1, 2, 3 | 1, 2, 3 | Analysis of Indeterminate Structures Frames | 2 | 4 | 6 |
| 1, 2, 3 | 1, 2, 3 | Slope–deflection method- General Procedure. | 2 | 4 | 7 |
| 1, 2, 3 | 1, 2, 3 | Slope –deflection method-for beams | 2 | 4 | 8 |
| 1, 2, 3 | 1, 2, 3 | Slope –deflection method- for frames | 2 | 4 | 9 |
| 1, 2, 3 | 1, 2, 3 | Moment distribution method- General Procedure. | 3 | 4 | 10 |
| 1, 2, 3 | 1, 2, 3 | Moment distribution method-for beam. | 3 | 4 | 11 |
| 1, 2, 3 | 1, 2, 3 | Moment distribution method-for frames. | 3 | 4 | 12 |
| 1, 2, 3 | 1, 2, 3 | The Force Method-General Procedure. | 3 | 4 | 13 |
| 1, 2, 3 | 1, 2, 3 | The Force Method- for beam. | 3 | 4 | 14 |
| 1, 2, 3 | 1, 2, 3 | The Force Method- for frames. | 3 | 4 | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | **Structural Analysis,** R.C. Hibbeler, 6th edition SI units, 2006. |
| 2. Main references (sources) | * Structural Analysis, Aslam, Kassim ali, 4th edition SI units 2006. * Structural Analysis in theory & Practice A.W Mims, 2004 |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Design of Concrete Structures, 325 WRDC** |
| **4. Modes of Attendance offered** | Seasonal 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 semester is composed of 15-week regular subjects. This subject is given 2 hrs. theoretical and 2 hrs. tutorial per week for one semester. Online lectures have been provided to the students using google classroom application. |
| **5. Semester/Year** | 2nd Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 4 hr. theoretical per week( second semester) |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to prepare the students to design and analysis the reinforced concrete buildings. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  1. The graduate student will be able to design and analyze beams, slabs and columns.  2. Calculate the allowable load and moment the beam can carry it  3. Find stress in concrete and steel for the reinforced concrete beams.  4. Design singly reinforced rectangular section.  5. Find the necessary area of flexural reinforcement required at the beam.  6. Find the dimensions of the beam.  7. Calculate the effective flange width of T-beam section.  8. Calculate the design strength for T-beam section.  9. Calculate shear strength (nominal strength and required strength).  10. Calculate shear strength provided by concrete and steel).  11. Design stirrup spacing.  12. Define type of slab (one way or two way).  13. Find slab thickness.  14. calculate the allowable load and moment the slab can carry it.  15. calculate the allowable load and moment the column can carry it. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1.Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Tests and Exams.  5. In-Class Questions and Discussions.  6. Connection between Theory and Application. | |
| **Assessment methods** | |
| 1. Examinations and Quizzes.  2. Student Engagement during Lectures. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| * Discussion with students * Oral quizzes | |
| **Assessment methods** | |
| * Respecting deadlines * Write reports | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-3 of article (12) | 1-10 of article (11) | Material properties | 1,2,3,4 | 2 the.  2 tut. | 16 |
| 1-3 of article (12) | 1-10 of article (11) | Analysis and design methods | 1,2,3,4 | 2 the.  2 tut. | 17 |
| 1-3 of article (12) | 1-10 of article (11) | Working stress method | 1,2,3,4 | 2 the.  2 tut. | 18 |
| 1-3 of article (12) | 1-10 of article (11) | Find the cracking moment | 1,2,4,5 | 2 the.  2 tut. | 19 |
| 1-3 of article (12) | 1-10 of article (11) | Analysis and design rectangular section beams | 1,2,4,5 | 2 the.  2 tut. | 20 |
| 1-3 of article (12) | 1-10 of article (11) | Ultimate strength method | 1,2,5,6,7,8 | 2 the.  2 tut. | 21 |
| 1-3 of article (12) | 1-10 of article (11) | Analysis and design of singly reinforced rectangular section beams | 1,2,5,6,7,8 | 2 the.  2 tut. | 22 |
| 1-3 of article (12) | 1-10 of article (11) | Analysis and design of singly reinforced T, an L sections beams | 1,2,4,5,6,9,10,11 | 2 the.  2 tut. | 23 |
| 1-3 of article (12) | 1-10 of article (11) | Introduction in shear design | 1,2,4,5,6,9,10,11 | 2 the.  2 tut. | 24 |
| 1-3 of article (12) | 1-10 of article (11) | Design beam for shear | 1,13,14 | 2 the.  2 tut. | 25 |
| 1-3 of article (12) | 1-10 of article (11) | Design of one-way slab | 1,13,14 | 2 the.  2 tut. | 26 |
| 1-3 of article (12) | 1-10 of article (11) | Design of two-way slab | 1,13,14 | 2 the.  2 tut. | 27 |
| 1-3 of article (12) | 1-10 of article (11) | Design of short axially loaded col. | 1,13,14 | 2 the.  2 tut. | 28 |
| 1-3 of article (12) | 1-10 of article (11) | Interaction diagrams for short col. | 1,15 | 2 the.  2 tut | 29 |
| 1-3 of article (12) | 1-10 of article (11) | Analysis of col. Under biaxial load | 1,15 | 2 the.  2 tut | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Design of Concrete Structures, 14th Edition Arthur H. Nilson, David Darwin, Charles W. Dolan, McGraw-Hill, 2020. |
| 2. Main references (sources) | 1. Design of Reinforced Concrete, ACI 318 Code Edition. Seventh Edition Jack C. McGormac, James K. Nelson, John Wiley, 2006.  2. Building Code Requirements for Structural Concrete, ACI 318M-11, American Concrete Institute, 2011.  3. Reinforced Concrete: A Fundamental Approach, 5th Edition Edward G. Nawy, Prentice Hall, 2005. |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Engineering Analysis, 326 WREA** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hr., 3 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| Solve the differential equation and applications to the first and second order differential equations | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  1.Classify differential equations by order, linearity, and homogeneity  2. Solve any first order differential equation.  3. Demonstrate variable separable, homogeneous, exact, linear, Bernoulli linear differential equations.  4. Set up and solve physical problems such as mixture problems.  5. Solve second order differential equations with constant coefficients and complementary and particular solutions.  6. Apply the methods of undetermined coefficients, variation of parameters and reduction of order.  7. Apply second order differential equations to springs.  8. Solve differential equations using power series.  9. Set up systems of linear differential equations using characteristic equations.  10. Solve systems of linear differential equations  11. Apply Fourier series to periodic functions.  12. Apply Euler’s Formula  13. Use the Wronskian determinant to test for linear independence or linear dependence | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures 2. Discussions 3. Problem solving 4. Student Questions 5. Student Participation 6. Oral Presentations 7. Homework 8. Exams 9. Connections between Theory and Application   Students are expected to read the material before coming to class and are strongly encouraged to come to class with a list of questions and to ask those questions. | |
| **Assessment methods** | |
| 1. Examination and Quizzes 2. Student Engagement during Lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-2 of article (12) | 1-9 of article (11) | Differential Equations |  | 3 | 1 |
| 1-2 of article (12) | 1-9 of article (11) | First – Order Differential Equations:  1- Separable equations |  | 3 | 1 |
| 1-2 of article (12) | 1-9 of article (11) | 2- Exact equation.  3- Homogeneous first-order equations |  | 3 | 2 |
| 1-2 of article (12) | 1-9 of article (11) | 4- First-order linear equations and integrating factors.  5- Bernoulli equations |  | 3 | 3 |
| 1-2 of article (12) | 1-9 of article (11) | Application of First- Order Differential Equations |  | 3 | 4 |
| 1-2 of article (12) | 1-9 of article (11) | Second – Order Differential Equations:  Homogeneous Equations with Constant Coefficient |  | 3 | 5 |
| 1-2 of article (12) | 1-9 of article (11) | Non-Homogeneous Linear Equations |  | 3 | 5 |
| 1-2 of article (12) | 1-9 of article (11) | Method of undermined coefficient |  | 3 | 5 |
| 1-2 of article (12) | 1-9 of article (11) | Method of variation of parameters |  | 3 | 6 |
| 1-2 of article (12) | 1-9 of article (11) | Second –Order Differential Equations (Reduction of order) |  | 3 | 7 |
| 1-2 of article (12) | 1-9 of article (11) | Euler-Cauchy Equations |  | 3 | 8 |
| 1-2 of article (12) | 1-9 of article (11) | Equation of Higher Order |  | 3 | 9 |
| 1-2 of article (12) | 1-9 of article (11) | System of Simultaneous Differential Equations |  | 3 | 10 |
| 1-2 of article (12) | 1-9 of article (11) | Laplace transform |  | 3 | 11 |
|  |  | Laplace transform |  | 3 | 12 |
| 1-2 of article (12) | 1-9 of article (11) | Inverse of Laplace transform . |  | 3 | 13 |
|  |  | Solution of differential equation by Laplace transform |  | 3 | 14 |
|  |  | Fourier Series. |  |  | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | **Text book**   * Advanced Engineering Mathematics.   References   * Ordinary Differential Equations. |
| 2. Main references (sources) | * Notebook Prepared by the Instructor. * Collection of Sheets of Solved and Unsolved Problems and Exams Questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Soil Conservation, 327WRSC** |
| **4. Modes of Attendance offered** | Three hours of study a week per unit day time on campus The academic year is composed of 15-week regular subjects. |
| **5. Semester/Year** | 1st Semester , Academic Year 2019 – 2020 |
| **6. Number of hours tuition (total)** | 45 hr., three hours theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The Course aims is to provide information about basic principles of soil and water conservation engineering, the mechanism of soil erosion, the methods and ways of avoiding erosion and soil loss estimation by universal soil equation. Classification of terraces and their design, and definitions grassed waterways and their design. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  The student in the field of soil conservation will be able to:  1-Introduce basic definitions and introductory concept of soil conservation engineering,  2-Introduce the importance of land use and land management for soil conservation,  3-Introduce the precipitation, analysis of precipitation data, and classification of storm,  4-Introduce the factors affecting runoff, and the methods used to determine runoff rate,  5-Introduce basic definitions, types, and process of water erosion, and principles of erosion control  6-Introduce the soil loss estimation by universal soil equation (USLE),  7-Introduce wind erosion , types of soil movement, mechanisms of wind erosion and erosion control,  8-Introduce design of shelterbelts,  9-Introduce the definitions of terraces, classification and their design,  10-Introduce the grassed waterways and their design. | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A2. An ability to design a system, or components, or process to meet desired needs.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context. | |
| **B. The skills goals special to the course.**  B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **10. Teaching and Learning Methods** | |
| 1- Lectures  2- Tutorials  3- Homework and Assignments  4- Tests and Exams  5- In-Class Questions and Discussions  6- Connection between Theory and Application  7- Extracurricular Activities  8- Seminars  9- In- and Out-Class oral conservations | |
| **11. 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) | |
| 12. Grading Policy | |
| 1. Quizzes 10%  2. Term Tests 20 %.  3. Final Exam: 70 %  - The final exam will be comprehensive.  - The final exam will count 70% of the total course grade | |
| **Teaching and Learning Methods** | |
| C. Affective and value goals  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning. | |
| Teaching and Learning Methods  Discussion with students | |
| Assessment methods  Respecting deadlines | |
| D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility. | |
| Teaching and Learning Methods  Oral quizzes | |
| Assessment methods  Write reports | |

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| ***13. Course Structure*** | | | | | |
| Assessment  Method | Teaching  Method | Unit/Module or  Topic Title | LOs  ( Article | Hour | Week |
| 1-4 of article (11) | 1-9 of article(10) | soil conservation concept | a, b, c | 3  theo | 1 |
| 1-4 of article (11) | 1-9 of article(10) | precipitation, analysis of precipitation data | a, b, c | 3  theo | 2 |
| 1-4 of article (11) | 1-9 of article(10) | classification of storm | a, b, c | 3  theo | 3 |
| 1-4 of article (11) | 1-9 of article(10) | Runoff ,factors affecting runoff, determine runoff rate | a, b, c | 3  theo | 4 |
| 1-4 of article (11) | 1-9 of article(10) | Erosion, types of erosion ,process and erosion control | a, b, c | 3  theo | 5 |
| 1-4 of article (11) | 1-9 of article(10) | Universal soil equation (USLE) and its application | a, b, c | 3  theo | 6 |
| 1-4 of article (11) | 1-9 of article(10) | Universal soil equation (USLE) and its application | a, b, d | 3  theo | 7 |
| 1-4 of article (11) | 1-9 of article(10) | Wind erosion ,types of soil movement, mechanisms of wind erosion | a, b, c | 3  theo | 8 |
| 1-4 of article (11) | 1-9 of article(10) | Wind erosion control | a, b, c | 3  theo | 9 |
| 1-4 of article (11) | 1-9 of article(10) | Design of shelterbelts | a, b, c | 3  theo | 10 |
| 1-4 of article (11) | 1-9 of article(10) | Terraces, classification of terraces, | a, b, c | 3  theo | 11 |
| 1-4 of article (11) | 1-9 of article(10) | Design of terraces, | a, b, c | 3  theo | 12 |
| 1-4 of article (11) | 1-9 of article(10) | Grassed waterways | a, b, c | 3  theo | 13 |
| 1-4 of article (11) | 1-9 of article(10) | Design of grassed waterways | a, b, c | 3  theo | 14 |
| 1-4 of article (11) | 1-9 of article(10) | Design of grassed waterways | a, b, c | 3  theo | 15 |

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| **14. Infrastructure** | |
| 1. Books Required reading: |  |
| 2. Main references (sources) | Schwab, et al. (1993). Soil and Water Conservation Engineering. Published by John Wiley & Sons, Inc. |
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| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **15. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Numerical Analysis,** [**328**](file:///C:\Users\Me\Desktop\المقرارات%20الدراسية\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) **WRNM** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom |
| **5. Semester/Year** | 2nd Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hours, 2 hrs theoretical and 2 hrs laboratory |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| understanding of numerical methods to obtain solutions of mathematical expressions.  In general, the course was designed to provide the students with computational techniques to solve engineering problems when no mathematical solution exists. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  1. finding roots of equations,  2. solving system of linear simultaneous equations,  3. finding values by interpolation,  4. finding values of integration expressions,  5. solving ordinary differential equations,  6. solving boundary value problems | |
| **A.Cognitive goals**  A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1. lectures,   b- tutorials, and  c- supervised team work | |
| **Assessment methods** | |
| a- homework,  b- quizzes,  c- major examination during the course, and  d- final examination | |
| **C. Affective and value goals**  C1. Affective and value goals  An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution to a problem | |
| **Teaching and Learning Methods** | |
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| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| a, b, c, and d | a | Introduction | a | 4  2 theo  2 lab | 15 |
| a, b, c, and d | a, b, c, and d | Roots of equations | a, b, and h | 8  4 theo  4 lab | 16, 17 |
| a, b, c, and d | a, b, c, and d | Systems of simultaneous linear equations | a, c, and h | 4  2 theo  2 lab | 18, 19 |
| a, b, c, and d | a, b, c, and d | Interpolation | a, d, and h | 4  2 theo  2 lab | 20 |
| a, b, c, and d | a, b, c, and d | Numerical Integration | a, e, and h | 8  4 theo  4 lab | 21, 22 |
|  |  | Examination |  | 4  2 theo  2 lab | 23 |
| a, b, c, and d | a, b, c, and d | Numerical solution of First order differential equations | a, f, and h | 8  4 theo  4 lab | 24, 25 |
| a, b, c, and d | a, b, c, and d | Numerical solution of Higher order ordinary differential equations | a, f, and h | 4  2 theo  2 lab | 26 |
| a, b, c, and d | a, b, c, and d | Finite differences | a, g, and h | 4  2 theo  2 lab | 27 |
| a, b, c, and d | a, b, c, and d | Numerical solution of boundary value problems | a, g, and h | 8  4 theo  4 lab | 28, 29 |
|  |  | Examination |  | 4  2 theo  2 lab | 30 |
| a, b, c, and d | a | Introduction | a | 4  2 theo  2 lab | 15 |
| a, b, c, and d | a, b, c, and d | Roots of equations | a, b, and h | 8  4 theo  4 lab | 16, 17 |
| a, b, c, and d | a, b, c, and d | Systems of simultaneous linear equations | a, c, and h | 4  2 theo  2 lab | 18, 19 |
| a, b, c, and d | a, b, c, and d | Interpolation | a, d, and h | 4  2 theo  2 lab | 20 |
| a, b, c, and d | a, b, c, and d | Numerical Integration | a, e, and h | 8  4 theo  4 lab | 21, 22 |
|  |  | Examination |  | 4  2 theo  2 lab | 23 |
| a, b, c, and d | a, b, c, and d | Numerical solution of First order differential equations | a, f, and h | 8  4 theo  4 lab | 24, 25 |
| a, b, c, and d | a, b, c, and d | Numerical solution of Higher order ordinary differential equations | a, f, and h | 4  2 theo  2 lab | 26 |
| a, b, c, and d | a, b, c, and d | Finite differences | a, g, and h | 4  2 theo  2 lab | 27 |
| a, b, c, and d | a, b, c, and d | Numerical solution of boundary value problems | a, g, and h | 8  4 theo  4 lab | 28, 29 |
|  |  | Examination |  | 4  2 theo  2 lab | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Amir Wadi Al Khafaji and John R. Tooley, Numerical methods in engineering practice.  - Advanced Engineering Mathematics, Fifth Edition, C. Ray Wylie and Louis C. Barrett  - Theory and Problems of Laplace Transforms by Murray R. Spiegel, Shaum’s Outline |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **English Language III, 329WREN** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures are provided to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 30 hr., 1 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| The aim of this course is to empower students with the language and life skills they need to carry out their goals. To this end it provides ample opportunities for students to build awareness and practice language in real- life scenarios. The integrated skills approach of the course develops the student's self-confidence to survive and succeed in professional and social encounters within an English-speaking global community. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  By the end of this communication skills course, the students will be able to:  1- Find and understand information about vocabulary, pronunciation, usage, and grammar in reference texts, online resources, and English language dictionaries.  2- Develop conversational English skills necessary for becoming a contributing participant in small group activities, large group discussions, and oral presentations.  3- Understand texts using effective learning strategies for reading and vocabulary building.  4- Demonstrate an appropriate level of control of grammatical accuracy and lexical appropriacy in written and oral communication. | |
| 1. **Cognitive goals** | |
| **B. The skills goals special to the course.** | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Homework and Assignments.  3. Tests and Exams.  4. In-Class Questions and Discussions.  5. Reports and Presentations. | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty Member (Instructor). | |
| **C. Affective and value goals** | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 3 of article (12) | 1-5 of  article (11) | Introduction to the course | 1 | 1 hr | 1 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: A world of different | 2 | 1 hr | 2 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 1: A world of different | 3 | 1 hr | 3 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: The working week | 4 | 1 hr | 4 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 2: The working week | 5 | 1 hr | 5 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: Good times, bad times | 6 | 1 hr | 6 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 3: Good times, bad times | 7 | 1 hr | 7 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Getting it right | 8 | 1 hr | 8 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 4: Getting it right | 9 | 1 hr | 9 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: Our changing world | 10 | 1 hr | 10 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 5: Our changing world | 11 | 1 hr | 11 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: What matters to me | 12 | 1 hr | 12 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 6: What matters to me | 13 | 1 hr | 13 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Passions and fashions | 14 | 1 hr | 14 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 7: Passions and fashions | 15 | 1 hr | 15 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: No fear! | 16 | 1 hr | 16 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 8: No fear! | 17 | 1 hr | 17 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: It depends how you look at it | 18 | 1 hr | 18 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 9: It depends how you look at it | 19 | 1 hr | 19 |
| 1 – 3 of article (12) | 11-5 of  article (11) | Unit 10: All things high tech | 20 | 1 hr | 20 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 10: All things high tech | 21 | 1 hr | 21 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Seeing is believing | 22 | 1 hr | 22 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Seeing is believing | 23 | 1 hr | 23 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Seeing is believing | 24 | 1 hr | 24 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 11: Seeing is believing | 25 | 1 hr | 25 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Telling it how it is | 26 | 1 hr | 26 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Telling it how it is | 27 | 1 hr | 27 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 12: Telling it how it is | 28 | 1 hr | 28 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Family ties | 29 | 1 hr | 29 |
| 1 – 3 of article (12) | 1-5 of  article (11) | Unit 13: Family ties | 30 | 1 hr | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | (1) New Headway Plus [intermediate] by John and Liz Soars, Oxford: Oxford University Press (2006) |
| 2. Main references (sources) | **References**  (1) Modern scientific articles from the news related to the students' specialty  ***Others***   1. Notebook prepared by the instructor of the   course   1. Collection of sheets of solved and unsolved   problems and Exams questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Design of Hydraulic Structures, 429 WRDH** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 150 hr., 5 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
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| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  1- Introduce basic definitions and introductory concepts of hydraulic structures and their use.  2- Introduce the definition, name, location and direction of regulator.  3- Introduce the hydraulic calculation of regulators (velocity and discharge).  4- Introduce the line of creep and up lift pressure theories (Bligh’s creep theory and Lane’s weighed line of creep method).  5- Introduce the flow net (Khosla’s theory / exit gradient, cut off depths and scouring depth)  6- Introduce the concrete floor thickness.  7- Introduce the transitions (kinds, properties, hydraulics, discharge equation, Mitra’s method, Hind’s method).  8- Introduce the energy dissipation (hydraulic jump, types and efficiency, type of flow D/S of gates and types of stilling basins).  9- Introduce protection of approaches U/S and D/S of concrete floors.  10- Introduce gates (types, water pressure and forces on gates, design principle  for sliding steel gates).  11- Introduce the closed regulating and conveyance structures (concrete pipes,  reinforced concrete culverts, single and multiple barrels and siphons).  12- Introduce the weirs (sharp and broad crested weirs).  13- Introduce the level control structures (canal outlet, canal escape, falls or  drops).  14- Introduce aqueducts.  15- Introduce some types of bridges that used in hydraulic canals, Drainages and reveres.  16- Introduce concrete design of two types of bridges (slab and dick concrete girder bridges).  17- Introduce comparison between rigid and elastic foundation with solving the differential equation of elastic foundation.  18- Introduce the concrete design of circular and rectangular tanks. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. Perform water resources engineering integrated design of systems,  components, or processes by means of practical experiences | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1-Examination, tests, and quizzes  2-Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning.  (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Review**  **& Rigid Foundations** | 1 | 5 | 1 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Introduction – Types of Hydraulic Structures and their use & elastic foundation** | 2 , 3 | 5 | 2 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Regulators & examples of elastic foundation** | 3 , 4 | 5 | 3 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Hydraulic calculations of regulators & examples of elastic foundation** | 4 | 5 | 4 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Line of creep and uplift pressure / Bligh’s theory and types of bridges.** | 5 | 5 | 5 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Weighed line of creep / Lane’s method & slab bridge design.** | 5 | 5 | 6 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **The cutoff depth &**  **flow net& slab bridge design.** | 6 | 5 | 7 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Khosla’s theory & slab bridge design.** | 6 | 5 | 8 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design example & deck girder bridge design.** | 7 | 5 | 9 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Scouring depth / Floor thickness & deck girder bridge design.** | 7 , 8 | 5 | 10 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design example & deck girder bridge design.** | 5, 6, 7, 8 | 5 | 11 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Transitions (kinds and properties) & deck.** | 9, 10 | 5 | 12 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design of transition / Metra method + Hind method.** | 9, 10 | 5 | 13 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design Examples** | 9,10 | 5 | 14 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Energy Dissipation / Hydraulic jump type and efficiency.** | 11 | 5 | 15 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Energy Dissipation / Hydraulic jump type and efficiency and box culvert concrete design.** | 11 | 5 | 16 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Stilling Basins and box culvert concrete design.** | 11 | 5 | 17 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Protection of approaches and box culvert concrete design.** | 12 | 5 | 18 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design Examples and box culvert concrete design.** | 12 | 5 | 19 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Gates / Types of gates** | 13 | 5 | 20 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design principle for sliding steel gates and concrete design of circular tanks (fixed base free top)** | 13 | 5 | 21 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Pipes / losses in pipes and concrete design of circular tanks (fixed base free top)** | 15 | 5 | 22 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Reinforced concrete culverts / single barrel.** | 15 | 5 | 23 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Reinforced concrete culverts / multiple barrels.** | 15 | 5 | 24 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Siphons / Design example and concrete design of circular tanks (hinge base free top)** | 15 | 5 | 25 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Design example and concrete design of circular tanks (hinge base free top** | 15 | 5 | 26 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Weirs (sharp and broad crested)** | 16 | 5 | 27 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Weirs (sharp and broad crested) and concrete design of rectangular tanks** | 16 | 5 | 28 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Escapes and concrete design of rectangular tanks** | 17 | 5 | 29 |
| **1 – 2 of**  **Article (12)** | **1 – 5 of**  **Article (11)** | **Flumes, Aqueduct and Drops** | 17, 18 | 5 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Varshney –Gupta– Gupta 1977 "Theory and Design of Irrigation Structures" 3rd. Edition Vol. II |
| 2. Main references (sources) | References  1- Chow, V.T.,1959 “Open Channel Hydraulics”  2- Davis, C.V., 1969 “Handbook of Applied Hydraulics” 3rd Edition.  3- U.S.B.R. 1958 “Hydraulic Design of Stilling Basins and Bucket Energy Dissipaters  4- Linsley and Franzini, 1972 “Water Resources Engineering” 2nd Edition.  5- U.S.B.R. 1974 “Design of Small Canal Structures”  6- FAO 1975 “Small Hydraulic Structures”.  7- Varshney – Gupta – Gupta 1977 "Theory and Design of Irrigation Structures" 3rd. Edition Vol. II  8- Punmia .B.C. & Pande B.B. Lal 1981 “Irrigation and Water Power”.  9- Santosh Kumar Garg 1997 “Irrigation Eng. & Hyd. Str.”  10- Larry W. Mays 2005 “Water Resources Eng.”  11- R.K. Sharma & T.K. Sharma 2008 “Irrigation Eng.”.  12- Dr.K.R. Arora 2009 “Irrigation, Water Power & Water Resources Eng.”. |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Design of On- Farm Irrigation Systems / 430 WRDI** |
| **4. Modes of Attendance offered** | 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. With an alternative using online lectures have been providing to the students using Google Classroom Application.  The academic year is composed of 30-week regular subjects. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 120 hr., 4 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Review basic irrigation principles. 2. Introduce the main types of mechanized on-farm irrigation systems. 3. Present the main steps followed to design irrigation systems. 4. Analyze each component of the various irrigation systems. 5. Discuss various methods of selecting each component of the systems. 6. Discuss the methods of selecting alternative designs. 7. Present the main methods to evaluate the performance of mechanized irrigation systems. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   |  | | --- | | 1. Understand and apply the irrigation principles in the design. | | 1. Define irrigation efficiency, distribution uniformity, coefficient of uniformity and overall efficiency. | | 1. Understand mechanized irrigation systems. Types of sprinkle irrigation systems. 2. Understand basic components of sprinkle systems. | | 1. Understand sprinkler selection. | | 1. Be able to calculate sprinkler discharge in sprinkle systems. | | 1. Be able to designed a lateral pipe (multi sizes) in sprinkle systems. | | 1. Be able to designed a lateral pipe (level lateral) in sprinkle systems. | | 1. Be able to designed a lateral pipe (uphill lateral) in sprinkle systems. | | 1. Be able to designed a lateral pipe (downhill lateral) in sprinkle systems. | | 1. Be able to calculate mainline discharges in sprinkle systems. | | 1. Be able to designing a mainline (hydraulic methods) in sprinkle systems. | | 1. Be able to designing a mainline (economical method) in sprinkle systems. | | 1. Be able to calculate total dynamics head. | | 1. Be able to designed sample of sprinkle irrigation systems. | | 1. Define an introduction to trickle irrigation systems. | | 1. Understand a basic components of trickle systems. | | 1. calculation a typical layout of a trickle irrigation system. | | 1. Be able to calculate an emitter selection. | | 1. Be able to calculate an emitter discharge. | | 1. Be able to calculate a water loss. | | 1. Be able to calculate a dimension of the wetted area. | | 1. Be able to calculate a head loss in the emitter connection. | | 1. Be able to designed a lateral in a trickle irrigation system. | | 1. Be able to designed a Manifold in a trickle irrigation system. | | 1. Be able to designed a Mainline in a trickle irrigation system. | | 1. Be able to calculate an emission uniformity. | | 1. Be able to designs of subunits in a trickle irrigation system. | | 1. Evaluation of fixed-grid sprinkle systems. 2. Evaluation of a trickle irrigation systems. | | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. An ability to design and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. Perform water resources engineering integrated design of systems, components, or processes by means of practical experiences (group projects). | |
| **Teaching and Learning Methods** | |
| 1. Lectures.  2. Tutorials.  3. Homework and Assignments.  4. Lab. Experiments.  5. Tests and Exams.  6. In-Class Questions and Discussions.  7. Connection between Theory and Application.  8. Extracurricular Activities | |
| **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). | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning.  (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1. Lectures  2. Tutorials  3. Home works  4. Test and exams  5. In class questions and discussions | |
| **Assessment methods** | |
| 1. Examinations, Tests and Quizzes  2. Extracurricular activities  3. Student engagement during lectures | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Review of irrigation principles. | 1 | 4  2 the.  2 tut. | 1 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Irrigation efficiency, distribution uniformity, coefficient of uniformity and overall efficiency. | 1,2 | 4  2 the.  2 tut. | 2 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Introduction to mechanized irrigation systems.  Types of sprinkle irrigation systems. | 3 | 4  2 the.  2 tut. | 3 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Basic components of sprinkle systems. | 3,4 | 4  2 the.  2 tut. | 4 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Sprinkler selection. | 5 | 4  2 the.  2 tut. | 5 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Sprinkler discharge | 6 | 4  2 the.  2 tut. | 6 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Lateral pipes (multi sizes) | 7 | 4  2 the.  2 tut. | 7 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Lateral design (level lateral). | 6,7,8 | 4  2 the.  2 tut. | 8 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Lateral design (uphill lateral). | 6,7,8,9 | 4  2 the.  2 tut. | 9 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Lateral design (downhill lateral). | 6,7,8,10 | 4  2 the.  2 tut. | 10 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Mainline discharges. | 6,7,8,9,1011 | 4  2 the.  2 tut. | 11 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Methods of designing a mainline (hydraulic methods). | 6,7,8,9,1011,12 | 4  2 the.  2 tut. | 12 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Methods of designing a mainline (economical method). | 6,7,8,9,1011,13 | 4  2 the.  2 tut. | 13 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Total dynamics head calculation. | 12,14 | 4  2 the.  2 tut. | 14 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Sample designs of sprinkle system. | 1-15 | 4  2 the.  2 tut. | 15 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Introduction to trickle irrigation systems. | 16 | 4  2 the.  2 tut. | 16 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Basic components of trickle systems. | 17 | 4  2 the.  2 tut. | 17 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | A typical layout of a trickle irrigation system. | 17,18 | 4  2 the.  2 tut. | 18 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Emitter selection. | 19 | 4  2 the.  2 tut. | 19 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Emitter discharge. | 20 | 4  2 the.  2 tut. | 20 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Water losses. | 21 | 4  2 the.  2 tut. | 21 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Dimension of the wetted area. | 22 | 4  2 the.  2 tut. | 22 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Head loss in the emitter connection. | 23 | 4  2 the.  2 tut. | 23 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Lateral design. | 19,20,24 | 4  2 the.  2 tut. | 24 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Manifold design. | 19,20,24,  25 | 4  2 the.  2 tut. | 25 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Mainline design. | 19,20,24,  25,26 | 4  2 the.  2 tut. | 26 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Emission uniformity. | 27 | 4  2 the.  2 tut. | 27 |
| 1, 2, 3, 4 | 1, 2, 3, 5, 6, 7, 8 | Sample designs of subunits. | 16-28 | 4  2 the.  2 tut. | 28 |
| 1, 2, 3, 4 | 1, 2, 3, 4, 5, 6, 7, 8 | Evaluation of fixed-grid sprinkle systems | 1-15,29 | 4  2 the.  2 tut. | 29 |
| 1, 2, 3, 4 | 1, 2, 3, 4, 5, 6, 7, 8 | Evaluation of trickle systems | 16-28,30 | 4  2 the.  2 tut. | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Kay. M. 1986, Sprinkler Irrigation System and Practice, Bedford, 141 p. 2. Keller, J. and Bliesner, R.D. 1990. Sprinkler Trickle Irrigation, Chapman and Hall, New York.   Keller, J. 1989. Sprinkler and Trickle Irrigation. Utah State University. Utah. |
| 2. Main references (sources) | 1. Notebook prepared by the instructor of the course   * 2. Collection of sheets of solved and unsolved problems and Exams |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| A Reviewing of the coarse details after 4 years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Groundwater, 431 WRGW** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. |
| **5. Semester/Year** | 1st Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hrs ) 2 theoretical and 1 tutorial per week) |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| This course aims to provide undergraduate students with the ability and skills to deal with principles of groundwater pooling (hydrology) and movement (hydraulics). | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. Understand important concepts in mathematics, science, and engineering.  A2. Learning the necessary issues to understand the impact of engineering solutions in a global and societal context.  A3. Acquainting students with sources and references for the development of their scientific and engineering skills.  A4. Develop a basic understanding of physical processes and properties that control the occurrence and movement of water in porous media. | |
| **B. The skills goals special to the course.**  B1. Understand important concepts ingroundwater**.**  B2. Develop a basic understanding of physical processes and properties that control the occurrence and movement of groundwater in the subsurface.  B3. Develop a basic understanding of aquifer properties and the movement of groundwater in the aquifers.  B4. Understand important concepts ingroundwater flow towards a well in confined and unconfined aquifers. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1-Examination, tests, and quizzes  2-Student engagement during lectures | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves Engineering problems.  C2. Teaching students that basic theory is important because technology is changing, along with enhancing their ability to self-learn.  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1. Lecture notes 2. Computer Software 3. Internet sources | |
| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1,2 | 1,2,3 | Groundwater and Aquifers | 1,2 | 3 | 1 |
| 1,2 | 1,2,3 | Applications of DARCY’s law | 1,2 | 3 | 2 |
| 1,2 | 1,2,3 | Applications of DARCY’s law | 1,2 | 3 | 3 |
| 1,2 | 1,2,3 | Applications of DARCY’s law | 1,2 | 3 | 4 |
| 1,2 | 1,2,3 | Numerical solution of Laplace’s equation. | 3 | 3 | 5 |
| 1,2 | 1,2,3 | Numerical solution of Laplace’s equation. | 3 | 3 | 6 |
| 1,2 | 1,2,3 | Steady groundwater flow systems. | 4 | 3 | 7 |
| 1,2 | 1,2,3 | Steady groundwater flow systems. | 4 | 3 | 8 |
| 1,2 | 1,2,3 | Steady groundwater flow systems. | 4 | 3 | 9 |
| 1,2 | 1,2,3 | Steady groundwater flow systems. | 4 | 3 | 10 |
| 1,2 | 1,2,3 | Unsteady groundwater flow systems. | 5 | 3 | 11 |
| 1,2 | 1,2,3 | Unsteady groundwater flow systems. | 5 | 3 | 12 |
| 1,2 | 1,2,3 | Superposition and Bounded aquifers | 6 | 3 | 13 |
| 1,2 | 1,2,3 | Superposition and Bounded aquifers | 6 | 3 | 14 |
| 1,2 | 1,2,3 | Superposition and Bounded aquifers | 6 | 3 | 15 |
| 1,2 | 1,2,3 | Steady groundwater flow systems. | 4 | 3 | 8 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Todd, D.K. and Mays, L.W. 2005, Groundwater Hydrology (Third Edition), John Wiley and Sons, NJ USA |
| 2. Main references (sources) | 1. Charles R. Fitts (2002), Groundwater Science. Elsevier Science . 2. Mays, L.W. (2012), Ground and Surface Water Hydrology. John Wiley ad Sons, NJ USA. 3. Mohammed, T.A. and Huat, B.K. (2004), Groundwater Engineering and Geotechnique, University Putra Malaysia Press, Serdang, Selangor, Malaysia. |
| A- Recommended books and references scientific journals, reports…). | ASCE, Engineering Journal, University of Baghdad |
| B-Electronic references, Internet  sites… | Iraqi virtual library |
| **12. The development of the curriculum plan** | |
| Update the syllabus and adding examples of applied cases. | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Drainage Engineering**, **432 WRDE** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. |
| **5. Semester/Year** | 2nd Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hr., 3 hr per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| This course aims to provide the undergraduate students with appility and skiles to deal with the groundwater occurence and movement. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Analysis of the horizontal, vertical and radial components of flow 2. Derivation and application of the steady state equations 3. Derivation and applications of the non-steady state equations 4. How to design composite pipe collectors | |
| 1. **Cognitive goals**   A1. Understand important concepts in mathematics, science, and engineering.  A2. The education necessary to understand the impact of engineering solutions in a global and societal context.  A3. Acquainting students with sources and references for the development of their scientific and engineering skills.  A4. Develop a basic understanding of physical processes and properties that control the occurrence and movement of water in poros media. | |
| **B. The skills goals special to the course.**  B1. Understand important concepts inDrainage Engineering**.**  B2. Develop a basic understanding of physical processes and properties that control the flow of water towards the drain channel.  B3. Develop a basic understanding of field drain properties and the movement of excess water in it.  B4. Understand important equations control the flow in a drain and calculated the spacing between drains. | |
| **Teaching and Learning Methods** | |
| 1. Lecture notes 2. Computer software 3. Internet sources | |
| **Assessment methods** | |
| 1. Written exams   2- Quizzes and a computer project | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves Engineering problems.  C2. Teaching students that basic theory is important because technology is changing, along with enhancing their ability to self-learn.  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| 1. Lecture notes 2. Computer software 3. Internet sources | |
| **Assessment methods** | |
| 1. Written exams   2- Quizzes and a computer project | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1,2 | 1,2,3 | Drainage difination | 1,2 | 3 | 17 |
| 1,2 | 1,2,3 | Drainage networks and types of field drains | 1,2 | 3 | 18 |
| 1,2 | 1,2,3 | Steady state drainage theories | 1,2 | 3 | 19 |
| 1,2 | 1,2,3 | Hooghoudt Equations | 3 | 3 | 20 |
| 1,2 | 1,2,3 | Nomograph of Boumans | 3 | 3 | 21 |
| 1,2 | 1,2,3 | Ernst Equations | 3 | 3 | 22 |
| 1,2 | 1,2,3 | Generalized Hooghoudt-Ernst Equations | 4 | 3 | 23 |
| 1,2 | 1,2,3 | Van-Bears approach | 4 | 3 | 24 |
| 1,2 | 1,2,3 | Applications of steady state equations | 4 | 3 | 25 |
| 1,2 | 1,2,3 | Drivation of unsteady state equations | 5 | 3 | 26 |
| 1,2 | 1,2,3 | Glover and dumm equations | 5 | 3 | 27 |
| 1,2 | 1,2,3 | Hydraulic design of pipe drains | 6 | 3 | 28 |
| 1,2 | 1,2,3 | Design of Uniform and nonuniform flow,rough and smoth pipes | 6 | 3 | 29 |
| 1,2 | 1,2,3 | Hydraulic design of the open drains and thier structures | 7 | 3 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1-H.P. Ritzema(1994)"Drainage Principles and Applications" International Institute for Land Reclamation and Improvemen. |
| 2. Main references (sources) | * Ministry of Irrigation (1983) “Design Manual for Irrigation and Drainage “ Ministry of irrigation, Baghdad. Iraq in cooperation with pencol Engineering consultants, London, England. * G.S .Ghuman (1990) “ Design of typical irrigation and drainage project “ Ministry of irrigation / state Organization for Land Reclamation ,Baghdad ,Iraq . * Vaughan .E. Hansen, Orson W, Israelsen and Glen E. Stringham (1980) “Irrigation Principle and Practices |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Construction Management / WRPM 434** |
| **4. Modes of Attendance offered** | 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-week regular subjects. Online lectures have been providing to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Developing the student's ability to understand and manage the project time. 2. How to manage time in different methods, 3. How to prepare the work activities schedule, 4. To calculate the progress of work, 5. To read and prepare the Bill of Quantities, and 6. Calculate the cost of the project activities and the factors affecting them.   Study the construction equipment and their productivities | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**   1. Introduce basic definitions and introductory concepts of management and its application in construction / projects. 2. Introduce the definition, names, and types of contracts. 3. Identification of how to manage the contracts and award on qualified contractors. 4. Introducing the main contracts which applying for the Iraqi environment work. 5. Introducing the types of construction equipment and plant and their productivities. | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A2. An ability to assign the management of work, or components, or process  to meet desired needs.  A3. The broad and different education which necessary to understand the impact of engineering solutions in a global and societal context.  A4. Knowledge of contemporary issues (this includes the presenting to the students of issues such as the impact of globalization on the modern management of construction, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B1. An ability to design the perfect path for complete the project and conduct experiments as well as to analyze and interpret data.  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. Performing the successful of project activity network with their  necessary resources. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2-Tutorials  3-Homework and Assignments  4-Tests and Exams  5-In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1-Examination, tests, and quizzes  2-Student engagement during lectures | |
| C. Affective and value goals  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning.  (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| Teaching and Learning Methods | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-4 of article (12) | a-f of article (11) | Concepts and Terms of construction and management, the resources required for any project. | a, b | 3 | 1 |
| 1-4 of article (12) | a-f of article (11) | The project life cycle .The major types of contracts between owner and the contractor. | C | 3 | 2 |
| 1-4 of article (12) | a-f of article (11) | Types of Planning and Scheduling (Gantt Chart) or the Bar Chart. | D | 3 | 3 |
| 1-4 of article (12) | a-f of article (11) | The Principles of Estimation. | e, f | 3 | 4 |
| 1-4 of article (12) | a-f of article (11) | Estimation of excavation volume for foundation, and estimating the concrete materials. | e, f, u | 3 | 5 |
| 1-4 of article (12) | a-f of article (11) | Preparing the contract in Iraq - Bill of Quantities- (B.O.Q) Reviewing the Official Documents in Contract; (Standard Documents) | e, f, u | 3 | 6 |
| 1-4 of article (12) | a-f of article (11) | The Standard Weights for the activities in project | e, f, u | 5 | 7 |
| 1-4 of article (12) | a-f of article (11) | The Standard Weights for the activities in project- part 2 | G | 3 | 8 |
| 1-4 of article (12) | a-f of article (11) | Planning with scheduling Critical Path Method (Activities on Arrow) | h, i, v | 3 | 9 |
| 1-4 of article (12) | a-f of article (11) | Planning and scheduling with Critical Path Method (Activities on Arrow) part 2 | h, i, v | 3 | 10 |
| 1-4 of article (12) | a-f of article (11) | Planning and scheduling with Grid Time Diagram | J | 3 | 11 |
| 1-4 of article (12) | a-f of article (11) | Planning and scheduling with Activities on Nodes | k, v | 3 | 12 |
| 1-4 of article (12) | a-f of article (11) | Planning and Scheduling the activities of Project with Precedence Method | k, v | 3 | 13 |
| 1-4 of article (12) | a-f of article (11) | Planning and Scheduling the activities of Project with PERT Technique. | l, v | 3 | 14 |
| 1-4 of article (12) | a-f of article (11) | Time Cost Relationship (Reduction the Time of Project) | m, v | 3 | 15 |
| 1-4 of article (12) | a-f of article (11) | Allocation (Smoothing) the Resources in Project | n, v | 3 | 16 |
| 1-4 of article (12) | a-f of article (11) | Allocation (Smoothing) the Resources in Project / part 2 | o, v | 3 | 17 |
| 1-4 of article (12) | a-f of article (11) | Equipment Economics - Elements of Ownership Cost | o, v | 3 | 18 |
| 1-4 of article (12) | a-f of article (11) | Equipment Economics - Elements of Operating Cost Part 2 | p, v | 3 | 19 |
| 1-4 of article (12) | a-f of article (11) | Planning for Earth Work Construction Earth Work Quantities | p, v | 3 | 20 |
| 1-4 of article (12) | a-f of article (11) | Planning for Earth Work Construction Mass Diagram Properties | q, v | 3 | 21 |
| 1-4 of article (12) | a-f of article (11) | Soil and Rock, Soil Weight –Volume Relationships | q, v | 3 | 22 |
| 1-4 of article (12) | a-f of article (11) | Soil and Rock, Amount of Water Required | R | 3 | 23 |
| 1-4 of article (12) | a-f of article (11) | Compaction and Stabilization Equipment, Types of Compacting Equipment. | r, v | 3 | 24 |
| 1-4 of article (12) | a-f of article (11) | Compaction and Stabilization Equipment, Roller Production Estimating. | S | 3 | 25 |
| 1-4 of article (12) | a-f of article (11) | Mobile Equipment Power, Requirements, Machine, Performance, Rolling Resistance | S | 3 | 26 |
| 1-4 of article (12) | a-f of article (11) | Mobile Equipment Power Requirements, Grade Resistance  Available Power, Rimpull, Drawbar Pull | T | 3 | 27 |
| 1-4 of article (12) | a-f of article (11) | Dozers, Dozer Performance, Characteristics, Blades (Blades Performance). | T | 3 | 28 |
| 1-4 of article (12) | a-f of article (11) | Dozers; Dozer Production Estimating | T | 3 | 29 |
| 1-4 of article (12) | a-f of article (11) | Scrapers: General Information, Scraper Types, Scrapers Volume of a Scraper and Scraper Operation | T | 3 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Construction Planning, Equipment, and Methods (Eighth Edition 2011)  by: Robert L. Peurifoy,  Clifford J. Schexnayder,  Aviad Shapira,   and Robert L. Schmitt |
| 2. Main references (sources) | * Construction Methods and Management by: S.W. Nunnally (Seventh Edition -2007) * Construction Management by: Daniel W. Halpin and Bolivar A.  Senior (Fourth Edition – 2012) * Construction Management Fundamentals by: Kraig Knutson, Clifford J. Schexnayder and Chistine Fiori (Indian Edition – 2009). * Standard Guide for analyzing the prices in construction sector. * The Standard Documents in construction contracts. |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Analysis of Water Resources Systems,** [**435**](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) **WRAS** |
| **4. Modes of Attendance offered** | One time, day time on campus |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| Water Resources Systems Analysis refers to the application of science of optimization in the field of water resources engineering. The course provides a basic concepts and methods that can help the water resources engineer in making his decision. The course is focused on the concepts and procedures used in formulation and solving problems in the field of water resources engineering. The students will be familiar with the applications in this field of engineering that can be addressed using linear and nonlinear optimization. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of water resources engineering will be able to:   * 1. understand the concepts of optimization,   2. formulate optimization problems in mathematical forms,   3. manipulate the mathematical forms,   4. solve linear mathematical forms, and   5. solve nonlinear mathematical forms. | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | |
| **Teaching and Learning Methods** | |
| a- lectures,  b- tutorials, and  c- supervised team work.. | |
| **Assessment methods** | |
| a- homework,  b- quizzes,  c- major examination during the course, and  d- final examination | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | |
| **Teaching and Learning Methods** | |
| * + - * 1. lectures,         2. tutorials, and         3. supervised team work. | |
| **Assessment methods** | |
| 1. homework**,** 2. quizzes, 3. major examination during the course, and 4. final examination. | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| a, b, c and d | a | Introduction | a | 2 | 1 |
| a, b, c and d | a, b, and c | Mathematical formulation | a and b | 4 | 2-3 |
| a, b, c and d | a, b, and c | Problem manipulation | a, b and c | 2 | 4 |
| a, b, c and d | a, b, and c | Linear problems: graphical method | a and d | 4 | 5-6 |
| a, b, c and d | a, b, and c | One phase simplex method | a and d | 4 | 7-8 |
| a, b, c and d | a, b, and c | Two phase simplex method | a and d | 2 | 9 |
|  |  | Examination |  | 2 | 10 |
| a, b, c and d | a, b, and c | Duality in linear problems | a and d | 4 | 11-12 |
| a, b, c and d | a, b, and c | Transportation problems | a and d | 4 | 13-14 |
| a, b, c and d | a, b, and c | Assignment problems | a and d | 2 | 15 |
| a, b, c and d | a, b, and c | Examination |  | 2 | 16 |
| a, b, c and d | a, b, and c | Network problems | a and d | 4 | 17-18 |
| a, b, c and d | a, b, and c | Introduction to nonlinear problems | a and e | 2 | 19 |
| a, b, c and d | a, b, and c | Extreme values of functions | a and e | 2 | 20 |
| a, b, c and d | a, b, and c | Methods of solution | a and e | 2 | 21 |
| a, b, c and d | a, b, and c | Newton method | a and e | 2 | 22 |
| a, b, c and d | a, b, and c | Hook and Jeeves Method | a and e | 2 | 23 |
| a, b, c and d | a, b, and c | Nelder and Mead method | a and e | 2 | 24 |
| a, b, c and d | a, b, and c | Steepest ascent method | a and e | 2 | 25 |
| a, b, c and d | a, b, and c | Rosenbrook method | a and e | 2 | 26 |
|  |  | Examination |  | 2 | 27 |
| a, b, c and d | a | Optimal management of water resources | a to e | 4 | 28-29 |
|  |  | Examination |  | 2 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | - Hamdy A. Taha , Operation Research.  - McCormick, G.P., Nonlinear Programming |
| 2. Main references (sources) | Theory and Applications, Wiley, Hoboken, NJ.   * Lectures notes of Prof. Dr. A. M. Ali |
| A- Recommended books and references scientific journals, reports…). | Water Resources Systems: modeling techniques and analysis |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| Review the coarse syllabus after two years | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Dams Engineering 436 WRDE** |
| **4. Modes of Attendance offered** | Students should attend 30 weeks that covering both in person and electronic education modes |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 90 hr., 3 hr per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. select the site and type of the dam  2. check the stability of gravity dams and assess the safety of earth dams  3. predict the generated power from dam site  4. determine the storage capacity of the dam reservoir | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  1. To select the site and the type of the dam  2. To analyze the forces on gravity dams  3. To check and quantity of seepage from earth dams for safety  assessment  4. To predict the generated power from dam site  5. To design the size of the dam reservoir    2. Teaching and Learning Assessment Methods: The methods used are  1. Lectures  2. Tutorials  3. Assignments (3 assignments)  4. Participations in class discussions  5. Tests and examinations (3 tests and on final examination | |
| **A.Cognitive goals**  A1. Apply knowledge of mathematic and engineering sciences  A2.  A3. The broad education necessary to understand the impact of engineering solutions in a global and societal context  A4. | |
| **B. The skills goals special to the course.**  B1. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice  B2.  B4. Perform water resources engineering integrated design of systems, components, or processes by means of practical experiences (group projects) | |
| **Teaching and Learning Methods** | |
|  | |
| **Assessment methods** | |
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| **C. Affective and value goals**  C1. Ability to describe of professional and ethical responsibility  C2. Ability to function effectively as an individual in a group | |
| **Teaching and Learning Methods** | |
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| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. Ability to communicate effectively with engineers, other professionals and community at large  D2. Ability to demonstrate the characteristics of a leader or a manager  D3.  D4. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| Assignment, Tests  And Examination | Lectures | Syllabus and Course policy | a | 2 (theo.) +1 (tut.) | 1 |
| Assignment, Tests  And Examination | Lectures | Investigation for dams | a,b | 2 (theo.) +1 (tut.) | 2 |
| Assignment, Tests  And Examination | Lectures | Selection of dam site | a,b,c | 2 (theo.) +1 (tut.) | 3 |
| Assignment, Tests  And Examination | Lectures | Site investigations | a,b,c,d | 2 (theo.) +1 (tut.) | 4 |
| Assignment, Tests  And Examination | Lectures | Types of dams | a,b,c,d | 2 (theo.) +1 (tut.) | 5 |
| Assignment, Tests  And Examination | Lectures | Gravity dams definitions, characteristics and classifications and forces on gravity dams | a,b,c,d | 2 (theo.) +1 (tut.) | 6 |
| Assignment, Tests  And Examination | Lectures | Gravity dams forces on gravity dams | a,b,c,d | 2 (theo.) +1 (tut.) | 7 |
| Assignment, Tests  And Examination | Lectures | Gravity dams  Combinations of forces for design | a,b,c,d | 2 (theo.) +1 (tut.) | 8 |
| Assignment, Tests  And Examination | Lectures | Gravity dams  Modes of failure | a,b,c,d,e | 2 (theo.) +1 (tut.) | 9 |
| Assignment, Tests  And Examination | Lectures | Applications  Test 1 | a,b,c,d,e | 2 (theo.) +1 (tut.) | 10 |
| Assignment, Tests  And Examination | Lectures | Gravity dams  Principal and shear stresses | a,b,c,d,e | 2 (theo.) +1 (tut.) | 11 |
| Assignment, Tests  And Examination | Lectures | Applications on gravity dam | a,b,c,d,e,f | 2 (theo.) +1 (tut.) | 12 |
| Assignment, Tests  And Examination | Lectures | Arch dams  Classification  Types of arch dams | a,b,c,d,e,f | 2 (theo.) +1 (tut.) | 13 |
| Assignment, Tests  And Examination | Lectures | Arch dams  Cylindrical theory  Application | a,b,c,d,e,f,g | 2 (theo.) +1 (tut.) | 14 |
| Assignment, Tests  And Examination | Lectures | Earth dams  Advantages and disadvantages | a,b,c,d,e,f,g | 2 (theo.) +1 (tut.) | 15 |
| Assignment, Tests  And Examination | Lectures | Earth dams  Types of earth dams  Types of failure | a,b,c,e | 2 (theo.) +1 (tut.) | 16 |
| Assignment, Tests  And Examination | Lectures | Seepage through homogenous and zoned earth dams | a,b,c,d,e, | 2 (theo.) +1 (tut.) | 17 |
| Assignment, Tests  And Examination | Lectures | Applications on seepage through earth dams | a,b,c,d,e, | 2 (theo.) +1 (tut.) | 18 |
| Assignment, Tests  And Examination | Lectures | Seepage under the earth dams  Methods of control | a,b,c,d,e, | 2 (theo.) +1 (tut.) | 19 |
| Assignment, Tests  And Examination | Lectures | Applications  Test 2 | a,b,c,d,e,f,g | 2 (theo.) +1 (tut.) | 20 |
| Assignment, Tests  And Examination | Lectures | Hydropower  Components of hydropower house  Types of hydropower house  Types of Turbines | a,b,c,d,e,f,g,h | 2 (theo.) +1 (tut.) | 21 |
| Assignment, Tests  And Examination | Lectures | Hydropower  Selection of turbine type  Estimation of hydropower | a,b,c,d,e,f,g,h | 2 (theo.) +1 (tut.) | 22 |
| Assignment, Tests  And Examination | Lectures | Planning for a dam reservoir  Function of a reservoir  Storage zones a reservoir | a,b,c,d,e,f,g,h, | 2 (theo.) +1 (tut.) | 23 |
| Assignment, Tests  And Examination | Lectures | Types of reservoirs  Yield of a reservoir | a,b,c,d,e,f,g,h,I, | 2 (theo.) +1 (tut.) | 24 |
| Assignment, Tests  And Examination | Lectures | Sedimentation of a reservoir  Trap efficiency of a reservoir | a,b,c,d,e,f,g,h,I, | 2 (theo.) +1 (tut.) | 25 |
| Assignment, Tests  And Examination | Lectures | Measures for Silting control in reservoirs | a,b,c,d,e,f,g,h,I,j, | 2 (theo.) +1 (tut.) | 26 |
| Assignment, Tests  And Examination | Lectures | Losses in reservoirs | a,b,c,d,e,f,g,h,I,j, | 2 (theo.) +1 (tut.) | 27 |
| Assignment, Tests  And Examination | Lectures | Determination of reservoir capacity  Mass curve | a,b,c,d,e,f,g,h,I,j, | 2 (theo.) +1 (tut.) | 28 |
| Assignment, Tests  And Examination | Lectures | Applications | a,b,c,d,e,f,g,h,I,j, | 2 (theo.) +1 (tut.) | 29 |
| Assignment, Tests  And Examination | Lectures | Test 3 | a,b,c,d,e,f,g,h,I,j, | 2 (theo.) +1 (tut.) | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | Design of Small Dams, United Sates Bureau of Reclamation, USBR, Oxford and IBH Publishing Company, 1974. |
| 2. Main references (sources) | * Irrigation Water Power and Water Resources Engineering, Arrora K.R., Standard Publisher, Delhi, 2009 * Engineering for Dams, Creager W.P., Justin J.D., Hinds J. Wiley Eastern Pvt. Ltd., New Delhi, 1968. * Roller Compacted Concrete Dams, Mehrotra V. K. Standard Publishers Distributors, Delhi, 2004. * Earth and Earth Rock Dams, Sherard J. L., Wood ward R. J., John Wiley & Sons , Inc., 1963 |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Applied Hydraulics,** [**437**](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) **WRAH** |
| **4. Modes of Attendance offered** | One time, day time on campus, Online lectures have been providing to the students using Google Classroom Application |
| **5. Semester/Year** | 2nd Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hr., 2 hr. theoretical and 1 hr tutorial per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| To apply the theoretical foundations of hydraulics that students have learned in previous years for different practical applications. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method** | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering. | |
| **B. The skills goals special to the course.**  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | |
| **Teaching and Learning Methods** | |
| a- lectures,  b- tutorials, and  c- supervised team work.. | |
| **Assessment methods** | |
| a- homework,  b- quizzes,  c- major examination during the course, and  d- final examination | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems. | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D3. Ability to demonstrate the characteristics of a team leader or a manager. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| (Article 12) | (Article 11) | Introduction, Pumps types and its hydraulics | = | 3  2 theo  1 tut | 16 |
| = | = | Pumps curves and pumps connection | = | 3  2 theo  1 tut | 17 |
| = | = | Similarity, cavitation and selection of pumps | = | 6  4 theo  2 tut | 18, 19 |
| = | = | Estimation of Water demand | = | 3  2 theo  1 tut | 20 |
| = | = | Water distribution system analysis: Hardy Cross method | = | 6  4 theo  2 tut | 21, 22 |
| = | = | Review and examination | = | 3  2 theo  1 tut | 23 |
| = | = | Hydraulic Turbines | = | 6  4 theo  2 tut | 24, 25 |
| = | = | Water Hammer | = | 6  4 theo  2 tut | 26, 27 |
| = | = | Unsteady flow in open channels | = | 6  4 theo  2 tut | 28, 29 |
| = | = | Review and examination | = | 3  2 theo  1 tut | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | - Chaudary, M. H., Transient analysis.  - Karassik, H. et al., Pumps Hand Book. |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
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**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Engineering Economy, 438 WREE** |
| **4. Modes of Attendance offered** | Annual system: There is only 0ne 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. The academic year is composed of 15-week regular subjects. Each week there are three lectures, and each lecture 50-mintues. Online lectures have been provided to the students using google classroom application. |
| **5. Semester/Year** | 1st Semester, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hr |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Graduate water resources engineers to serve in water resource management  2. Improving the teaching and the administrative activities to meet international accreditation standards and the mission of departments.  3. Improving the academic abilities of the faculty and attracting highly skilled personnel.  4. Improve the abilities of management and technical support staff and attract the highly skilled for employment.  5. Optimum use of resources and potential of the department. | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  At the end of the class, the student will be able to:  a-Define economics in general and all terms that will be used at the course.  b- Know about types of interest and their effects on present value and estimation of the future value.  c- Give the students a sound understanding of the basic aspects of the subject and some insight into approaches that can be used for making sound economic decisions concerning the type of problem he is likely to encounter in his engineering career.  d- Know about the depreciation and its effect on the asset.  e- Acquire a solid base for further studies after graduation, which will permit him to understand and use more advanced, and constantly developing, procedures needed to help in analyzing the more complex economic problem that he may encounter in his career.  f- Evaluate engineering projects.  g- Be able to carry out economics studies and alternatives. | |
| 1. **Cognitive goals**   A1. An ability to apply knowledge of mathematics, science, and engineering.  A4. Knowledge of contemporary issues (this includes presenting students with issues such as the impact of globalization, the outsourcing of both engineering and other supporting jobs as practiced by modern international users). | |
| **B. The skills goals special to the course.**  B2. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1-Lectures  2- Tutorials  3-Homework and Assignment  4-Test and Exams  5-In class Questions and Discussion | |
| **Assessment methods** | |
| 1. Examinations and Quizzes.  2. Student Engagement during Lectures. | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning. (this includes teaching students that the underlying theory is important because the technology changes, coupled with enhancing their self-learning ability).  C3. Ability to function effectively as an individual in a group.  C4. Ability to identify, formulate and provide creative/innovative/effective solution to a problem | |
| **Teaching and Learning Methods** | |
| * Discussion with students * Oral quizzes | |
| **Assessment methods** | |
| * Respecting deadlines * Write reports | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1-3 of article (12) | 1-5 of article (11) | Introduction, simple and compound interest | a | 3 th | 1 |
| 1-3 of article (12) | 1-5 of (11) article | Nominal and effective interest | a, b | 3 th | 2 |
| 1-3 of article (12) | 1-5of article (11) | Annuity(uniform series payments) | a, b | 3 th | 3 |
| 1-3 of article (12) | 1-5 of article (11) | Annuity(uniform series payments) | b, c | 3 th | 4 |
| 1-3 of article (12) | 1-5 of article (11) | Arithmetic gradient uniform series | d | 3 th | 5 |
| 1-3 of article (12) | 1-5of article (11) | Arithmetic gradient uniform series | d | 3 th | 6 |
| 1-3 of article (12) | 1-5 of article (11) | Depreciation, SL Method | d | 3 th | 7 |
| 1-3 of article (12) | 1-5 of article (11) | S.F Method | d | 3 th | 8 |
| 1-3 of article (12) | 1-5 of article (11) | Matheson Method | d | 3 th | 9 |
| 1-3 of article (12) | 1-5 of article (11) | S.Y.D method | e, f | 3 th | 10 |
| 1-3 of article (12) | 1-5 of article (11) | Basic Methods for Economic Studies | e, f | 3 th | 11 |
| 1-3 of article (12) | 1-5 of article (11) | Basic Methods for Economic Studies | f, g | 3 th | 12 |
| 1-3 of article (12) | 1-5 of article (11) | Compare the alternatives | f, g | 3 th | 13 |
| 1-3 of article (12) | 1-5 of article (11) | Compare the alternatives | f, g | 3 th | 14 |
| 1-3 of article (12) | 1-5 of article (11) | Compare the alternatives | g | 3 th | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | 1. Engineering Economy (fifth edition ),by E. Paul De Garmo ,Jhon R. Canada .1985,Macmillan Publishing Co., Inc. |
| 2. Main references (sources) | * Fundamentals of Engineering Economics by Chan S. Park * Engineering Economic Analysis, Eleventh Edition, by Donald G. Newnan,2012 |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| **TEMPLATE FOR COURSE SPECIFICATION**   |  |  | | --- | --- | | **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | | | **COURSE SPECIFICATION**  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 programme specification. | | | **1. Teaching Institution** | University of Baghdad  College of Engineering | | **2. University Department/Centre** | Department of Water Resources | | **3. Course title/code** | **Analysis of Water Resources Systems,** [**435**](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) **WRAS** | | **4. Modes of Attendance offered** | One time, day time on campus | | **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2019 | | **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week | | **7. Date of production/revision of this specification** | 2019 | | **8. Aims of the Course** | | | Water Resources Systems Analysis refers to the application of science of optimization in the field of water resources engineering. The course provides a basic concepts and methods that can help the water resources engineer in making his decision. The course is focused on the concepts and procedures used in formulation and solving problems in the field of water resources engineering. The students will be familiar with the applications in this field of engineering that can be addressed using linear and nonlinear optimization. | | | **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of water resources engineering will be able to:   1. understand the concepts of optimization, 2. formulate optimization problems in mathematical forms, 3. manipulate the mathematical forms, 4. solve linear mathematical forms, and 5. solve nonlinear mathematical forms. | | | 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | | | **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | | | **Teaching and Learning Methods** | | | a- lectures,  b- tutorials, and  c- supervised team work.. | | | **Assessment methods** | | | a- homework,  b- quizzes,  c- major examination during the course, and  d- final examination | | | **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | | | **Teaching and Learning Methods** | | | * lectures, * tutorials, and * supervised team work. | | | **Assessment methods** | | | * homework**,** * quizzes, * major examination during the course, and * final examination. | | | **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **10. Course Structure** | | | | | | | **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** | | a, b, c and d | a | Introduction | a | 2 | 1 | | a, b, c and d | a, b, and c | Mathematical formulation | a and b | 4 | 2-3 | | a, b, c and d | a, b, and c | Problem manipulation | a, b and c | 2 | 4 | | a, b, c and d | a, b, and c | Linear problems: graphical method | a and d | 4 | 5-6 | | a, b, c and d | a, b, and c | One phase simplex method | a and d | 4 | 7-8 | | a, b, c and d | a, b, and c | Two phase simplex method | a and d | 2 | 9 | |  |  | Examination |  | 2 | 10 | | a, b, c and d | a, b, and c | Duality in linear problems | a and d | 4 | 11-12 | | a, b, c and d | a, b, and c | Transportation problems | a and d | 4 | 13-14 | | a, b, c and d | a, b, and c | Assignment problems | a and d | 2 | 15 | | a, b, c and d | a, b, and c | Examination |  | 2 | 16 | | a, b, c and d | a, b, and c | Network problems | a and d | 4 | 17-18 | | a, b, c and d | a, b, and c | Introduction to nonlinear problems | a and e | 2 | 19 | | a, b, c and d | a, b, and c | Extreme values of functions | a and e | 2 | 20 | | a, b, c and d | a, b, and c | Methods of solution | a and e | 2 | 21 | | a, b, c and d | a, b, and c | Newton method | a and e | 2 | 22 | | a, b, c and d | a, b, and c | Hook and Jeeves Method | a and e | 2 | 23 | | a, b, c and d | a, b, and c | Nelder and Mead method | a and e | 2 | 24 | | a, b, c and d | a, b, and c | Steepest ascent method | a and e | 2 | 25 | | a, b, c and d | a, b, and c | Rosenbrook method | a and e | 2 | 26 | |  |  | Examination |  | 2 | 27 | | a, b, c and d | a | Optimal management of water resources | a to e | 4 | 28-29 | |  |  | Examination |  | 2 | 30 |  |  |  | | --- | --- | | **11. Infrastructure** | | | 1. Books Required reading: | - Hamdy A. Taha , Operation Research.  - McCormick, G.P., Nonlinear Programming | | 2. Main references (sources) | Theory and Applications, Wiley, Hoboken, NJ.   * Lectures notes of Prof. Dr. A. M. Ali | | A- Recommended books and references scientific journals, reports…). | Water Resources Systems: modeling techniques and analysis | | B-Electronic references, Internet  sites… |  | | **12. The development of the curriculum plan** | | | Review the coarse syllabus after two years | | | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **Water Quality / 439 WREC** |
| **4. Modes of Attendance offered** | Semester 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 semester is composed of 15-week regular subjects. Online lectures are provided to the students using Google Classroom Application. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 45 hr., 3 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. General review of open channel hydraulic  2. Definitions and introductory concepts of water quality.  3. Definitions and introductory concepts of water and pollution processes in rivers, lakes and ground water  4. Definitions of surface water pollution  5. Explain and definition source of pollution type  6. Explain discharge of pollutant into river and mixing zone  7. Definitions conservative and non-conservative pollutant  8. Explain and definition surface water impurities  9. Definitions BOD and Oxygen sag curve  10. Definition Iraqi law for water quality protection in river No. 25 for 1967  11. Assessment the water quality in Iraq rivers and surface water | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  At the end of the class, the student will be able to:  1. Define and introduce concepts of water quality  2. Understand and apply concepts of water quality and pollution processes in rivers and lakes  3. Understand and apply the different steps of the monitoring cycle in rivers and lakes;  4. Understand the basic concepts of groundwater quality and monitoring;  5. Apply common statistical techniques for water quality data evaluation;  6. Design sound and sustainable freshwater quality monitoring and assessment programs under specified conditions.  7. Understand modeling BOD/DO in a river system  8. Understand and apply the Iraqi law for water quality protection in river No. 25 for 1967  9. Understand and apply the water quality in Iraq rivers and water surface | |
| 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | |
| **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems. | |
| **Teaching and Learning Methods** | |
| 1- Lectures  2- Tutorials  3- Homework and Assignments  4- Tests and Exams  5- In-Class Questions and Discussions  6- Connection between Theory and Application  7- Extracurricular Activities  8- Seminars  9- In- and Out-Class oral conservations | |
| **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) | |
| **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning | |
| **Teaching and Learning Methods** | |
| Discussion with students | |
| **Assessment methods** | |
| Respecting deadlines | |
| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D2. An understanding of professional and ethical responsibility. | |

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| **10. Course Structure** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-9 of article (11) | Introduction to Water Quality | 1 | 2 (theo.) +1 (tut.) | 1 |
| 1 – 4 of article (12) | 1-9 of article (11) | Water Quality Parameters | 2 | 2 (theo.) +1 (tut.) | 2 |
| 1 – 4 of article (12) | 1-9 of article (11) | General Types of Water Pollutants | 3 | 2 (theo.) +1 (tut.) | 3 |
| 1 – 4 of article (12) | 1-9 of article (11) | Iraqi Specifications for Drinking Water, WHO Standards | 4 | 2 (theo.) +1 (tut.) | 4 |
| 1 – 4 of article (12) | 1-9 of article (11) | Sampling Methods and Equipment of Surface Water | 5 | 2 (theo.) +1 (tut.) | 5 |
| 1 – 4 of article (12) | 1-9 of article (11) | Sampling Methods and Equipment of Groundwater | 6 | 2 (theo.) +1 (tut.) | 6 |
| 1 – 4 of article (12) | 1-9 of article (11) | Modeling Surface Waters Flow and Pollution, Mass Balance Approach | 7 | 2 (theo.) +1 (tut.) | 7 |
| 1 – 4 of article (12) | 1-9 of article (11) | Oxygen Demand of wastewater, Reaeration and deoxygenating Rate constants | 8 | 2 (theo.) +1 (tut.) | 8 |
| 1 – 4 of article (12) | 1-9 of article (11) | Self-Purification, Sag-Curve | 9 | 2 (theo.) +1 (tut.) | 9 |
| 1 – 4 of article (12) | 1-9 of article (11) | Longitudinal Dispersion | 10 | 2 (theo.) +1 (tut.) | 10 |
| 1 – 4 of article (12) | 1-9 of article (11) | Models of Surface Water Quality | 11 | 2 (theo.) +1 (tut.) | 11 |
| 1 – 4 of article (12) | 1-9 of article (11) | Application | 12 | 2 (theo.) +1 (tut.) | 12 |
| 1 – 4 of article (12) | 1-9 of article (11) | Models of Ground water Quality | 13 | 2 (theo.) +1 (tut.) | 13 |
| 1 – 4 of article (12) | 1-9 of article (11) | Application | 14 | 2 (theo.) +1 (tut.) | 14 |
| 1 – 4 of article (12) | 1-9 of article (11) | Water Quality Index | 15 | 2 (theo.) +1 (tut.) | 15 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | - No text book |
| 2. Main references (sources) | **References**  1. Water Supply and Pollution Control, John W. Clark Models for Water Quality Managements,  2. Principles of Water Quality Control by T.H.Y. Tebbutt 5ed. 1998  ***Others***  1. Notebook prepared by the instructor of the course  2. Collection of sheets of solved and  solved problems and exams questions |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
| **TEMPLATE FOR COURSE SPECIFICATION**   |  |  | | --- | --- | | **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | | | **COURSE SPECIFICATION**  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 programme specification. | | | **1. Teaching Institution** | University of Baghdad  College of Engineering | | **2. University Department/Centre** | Department of Water Resources | | **3. Course title/code** | **Analysis of Water Resources Systems,** [**435**](file:///D:\maysam\UNIVERCITY\ادارية\قسم%20الموارد%20المائية\لجنة%20الجودة%20والاعتمادية\2016\اكتمل%20وسلم\استمارة%20وصف%20البرنامج%20الاكاديمي%202016\وصف%20البرنامج%20الاكاديمي\مفردات3,4\EW450%20%20Analysis%20of%20Water%20Resources%20System.doc) **WRAS** | | **4. Modes of Attendance offered** | One time, day time on campus | | **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2019 | | **6. Number of hours tuition (total)** | 60 hr., 2 hr. theoretical per week | | **7. Date of production/revision of this specification** | 2019 | | **8. Aims of the Course** | | | Water Resources Systems Analysis refers to the application of science of optimization in the field of water resources engineering. The course provides a basic concepts and methods that can help the water resources engineer in making his decision. The course is focused on the concepts and procedures used in formulation and solving problems in the field of water resources engineering. The students will be familiar with the applications in this field of engineering that can be addressed using linear and nonlinear optimization. | | | **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  the student in the field of water resources engineering will be able to:   1. understand the concepts of optimization, 2. formulate optimization problems in mathematical forms, 3. manipulate the mathematical forms, 4. solve linear mathematical forms, and 5. solve nonlinear mathematical forms. | | | 1. **Cognitive goals**   A1. To have the ability to apply knowledge of mathematics, science, and engineering.  A2. To have the ability to make decisions to meet desired needs.  A3. To have the ability to have the broad education necessary to understand the impact of engineering solutions. | | | **B. The skills goals special to the course.**  B1. To have the ability to analyze and interpret data.  B2. To have the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.  B3. To have the ability to Apply basic mathematical and scientific concepts for the description and solution of engineering problems.  B4. To have an ability to perform water resources engineering integrated design of systems, components, or processes. | | | **Teaching and Learning Methods** | | | a- lectures,  b- tutorials, and  c- supervised team work.. | | | **Assessment methods** | | | a- homework,  b- quizzes,  c- major examination during the course, and  d- final examination | | | **C. Affective and value goals**  C1. An ability to identify, formulates, and solves engineering problems.  C2. A recognition of the need for and an ability to engage in life-long learning  C3.Enhancing self-learning ability.  C4. Ability to identify, formulate and provide creative/innovative/effective solution of a problems. | | | **Teaching and Learning Methods** | | | * lectures, * tutorials, and * supervised team work. | | | **Assessment methods** | | | * homework**,** * quizzes, * major examination during the course, and * final examination. | | | **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D1. An ability to function on multi-disciplinary teams (multi-disciplinary teams mean teams of individuals with similar educational backgrounds focusing on different aspects of a project as well as teams of individuals with different educational backgrounds).  D2. An understanding of professional and ethical responsibility.  D3. Ability to demonstrate the characteristics of a team leader or a manager.  D4. Ability to communicate effectively with engineers, other professionals and community at large | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **10. Course Structure** | | | | | | | **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LO's** | **Hours** | **Week** | | a, b, c and d | a | Introduction | a | 2 | 1 | | a, b, c and d | a, b, and c | Mathematical formulation | a and b | 4 | 2-3 | | a, b, c and d | a, b, and c | Problem manipulation | a, b and c | 2 | 4 | | a, b, c and d | a, b, and c | Linear problems: graphical method | a and d | 4 | 5-6 | | a, b, c and d | a, b, and c | One phase simplex method | a and d | 4 | 7-8 | | a, b, c and d | a, b, and c | Two phase simplex method | a and d | 2 | 9 | |  |  | Examination |  | 2 | 10 | | a, b, c and d | a, b, and c | Duality in linear problems | a and d | 4 | 11-12 | | a, b, c and d | a, b, and c | Transportation problems | a and d | 4 | 13-14 | | a, b, c and d | a, b, and c | Assignment problems | a and d | 2 | 15 | | a, b, c and d | a, b, and c | Examination |  | 2 | 16 | | a, b, c and d | a, b, and c | Network problems | a and d | 4 | 17-18 | | a, b, c and d | a, b, and c | Introduction to nonlinear problems | a and e | 2 | 19 | | a, b, c and d | a, b, and c | Extreme values of functions | a and e | 2 | 20 | | a, b, c and d | a, b, and c | Methods of solution | a and e | 2 | 21 | | a, b, c and d | a, b, and c | Newton method | a and e | 2 | 22 | | a, b, c and d | a, b, and c | Hook and Jeeves Method | a and e | 2 | 23 | | a, b, c and d | a, b, and c | Nelder and Mead method | a and e | 2 | 24 | | a, b, c and d | a, b, and c | Steepest ascent method | a and e | 2 | 25 | | a, b, c and d | a, b, and c | Rosenbrook method | a and e | 2 | 26 | |  |  | Examination |  | 2 | 27 | | a, b, c and d | a | Optimal management of water resources | a to e | 4 | 28-29 | |  |  | Examination |  | 2 | 30 |  |  |  | | --- | --- | | **11. Infrastructure** | | | 1. Books Required reading: | - Hamdy A. Taha , Operation Research.  - McCormick, G.P., Nonlinear Programming | | 2. Main references (sources) | Theory and Applications, Wiley, Hoboken, NJ.   * Lectures notes of Prof. Dr. A. M. Ali | | A- Recommended books and references scientific journals, reports…). | Water Resources Systems: modeling techniques and analysis | | B-Electronic references, Internet  sites… |  | | **12. The development of the curriculum plan** | | | Review the coarse syllabus after two years | | | |

**TEMPLATE FOR COURSE SPECIFICATION**

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| **HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW** | |
| **COURSE SPECIFICATION**  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 programme specification. | |
| **1. Teaching Institution** | University of Baghdad  College of Engineering |
| **2. University Department/Centre** | Department of Water Resources |
| **3. Course title/code** | **English Language / 440WREN** |
| **4. Modes of Attendance offered** | 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 the subject using electronic education at the time being and face-to-face mode after the pandemic will over. The academic year is  Composed of 30-week regular subjects. This subject is given one per hour per for whole academic year. |
| **5. Semester/Year** | 1st and 2nd Semesters, Academic year 2019 –2020 |
| **6. Number of hours tuition (total)** | 30 hr., 1 hr. per week |
| **7. Date of production/revision of this specification** | 2020 |
| **8. Aims of the Course** | |
| 1. Use English verbs and tenses properly in their writing and speaking  2. Pronounce the English words correctly  3. Use the countable and uncountable nouns in the written and spoken sentences  4. Express the quantities in the written and spoken sentences  5. Use the participles in the written and spoken sentences  6. Write academic report for laboratory and for any other topic related to the field of water resources engineering | |
| **9· Learning Outcomes, Teaching ,Learning and Assessment Method**  The graduate student will be able to:  1. Write sentence without making mistakes in the tenses of the verbs  2. Express the quantities, countable and uncountable nouns and  properly use the participles in the written and spoken sentences  3. Improve his vocabulary in reading, writing, listening and speaking | |
| 1. **Cognitive goals** | |
| **B. The skills goals special to the course.** | |
| **Teaching and Learning Methods** | |
| a- lectures,  b- tutorials, and  c- Homework and Assignments  d- Tests and Exams  e- In-Class Questions and Discussions | |
| **Assessment methods** | |
| 1. Examinations, Tests, and Quizzes.  2. Student Engagement during Lectures.  3. Responses Obtained from Students, Questionnaire about Curriculum and Faculty  Member (Instructor). | |
| **C. Affective and value goals** | |
| **Teaching and Learning Methods** | |
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| **Assessment methods** | |
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| **D. General and rehabilitative transferred skills**(other skills relevant to employability and personal development)  D4. Ability to communicate effectively with engineers, other professionals and community at large | |

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| ***14. Course Structure*** | | | | | |
| Assessment Methods | Teaching method | Topic Title | LOs | Hours | Week |
| Quiz, test, exam | Lectures | Tenses such as simple present, present continuous, past simple, past continuous, present perfect, future simple, modal, modal perfect, active and passive. | 1 | 3 | 1 |
| 2 |
| 3 |
| Quiz, test, exam | Lectures | Auxiliary or helping verbs (have, be and do), Modal auxiliary verbs, Phrase verb, Pronunciation, proposition, Vocabulary (reading, writing, listening and speaking) | 1 | 3 | 4 |
| 5 |
| 6 |
| Quiz, test, exam | Lectures | Phrase verb, Pronunciation, proposition, | 1,2 | 3 | 7 |
| 8 |
| 9 |
|  |  | Test | 1,2 | 1 | 10 |
| Quiz, test, exam | Lectures | Phrase verb, Pronunciation, proposition, | 1,2 | 3 | 11 |
| 12 |
| 13 |
| Quiz, test, exam | Lectures | Vocabulary (reading, writing) | 3 | 3 | 14 |
| 15 |
| 16 |
| Quiz, test, exam | Lectures | Vocabulary  (listening and speaking) | 3 | 3 | 17 |
| 18 |
| 19 |
| Quiz, test, exam | Lectures | Countable and uncountable nouns | 3 | 3 | 20 |
| 21 |
| 22 |
| Quiz, test, exam | Lectures | Vocabulary  (Countable and uncountable nouns) | 3 | 3 | 23 |
| 24 |
| 25 |
| Quiz, test, exam | Lectures | expressing quantity, participles | 1,2,3 | 4 | 26 |
| 27 |
| 28 |
| 29 |
| Quiz, test, exam | Lectures | test | 1,2,3 | 1 | 30 |

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| **11. Infrastructure** | |
| 1. Books Required reading: | The new Headway ( Upper Intermediate workbook with Key)  By Liz and John Soars, Sylvia Wheel don |
| 2. Main references (sources) |  |
| A- Recommended books and references scientific journals, reports…). |  |
| B-Electronic references, Internet  sites… |  |
| **12. The development of the curriculum plan** | |
|  | |