**COURSE SPECIFICATION**

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

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| College of Engineering/ University of Baghdad | 1. Teaching Institution |
| Chemical Engineering | 2. University Department/Centre |
| Fluid Flow | 3. Course title/code |
| Chemical Engineering Program | 4. Programme(s) to which it contributes |
| Annual System  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. Modes of Attendance offered |
| 1st & 2nd / Academic Year 2017 – 2018 | 6. Semester/Year |
| 90 hrs. / 3 hrs. per week | 7. Number of hours tuition (total) |
| 5/10/2017 | 8. Date of production/revision of this specification  |
| 9. Aims of the Course |
| 1. An introduction to the subject of fluid flow and the type of fluids and flow, and dimensional analysis.
2. Pressure measurements by simple manometer and Bourdon gauge.
3. Evaluation of volumetric flow rates and average velocities and continuity equation.
4. Understanding Bernoulli's equation and its applications.
5. Evaluation of head losses in pipes.
6. The utilization of flow rates devices.
7. Pumps and turbines with their efficiencies.
8. Flow of fluids in packed beds.
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| 10· Learning Outcomes, Teaching ,Learning and Assessment Method  |
| 1. Knowledge and Understanding

A1.Calculation and equations of the fluid flow like Newton law and Bernoulli equation, etc. A2. Presentation of the different applications related to the subjectA3. The best device for flow measurements and the correct type of pump and the best placement.A4. The losses due to friction in pipes and fittings and different devices.A5. Flow through packed beds and the equations used in these systems. |
|  B. Subject-specific skillsB1. Solving problems using different mathematics and numerical ways.B2. Derivations contributed to the different subjects.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_C. Thinking Skills C1. Developing critical and creative thinking skills related to fluid flow.C2. Using mathematical models.C3. Analysis assumptions.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  D. General and Transferable Skills (other skills relevant to employability and personal development)  D1. Community affectivity. D2. Work individually and team members in international and multidisciplinary teams. D3. Understanding impact of engineering solutions in an environmental and social context. |
|  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. Field Trips.
8. Seminars.
9. In- and Out-Class oral conservations.
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|  Assessment methods  |
| 1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students
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| 11. Course Structure |
| Assessment Method | TeachingMethod | Unit/Module or Topic Title | ILOs | Hours | Week |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Introduction to fluid flow | A1,A2, B1, B2 | 32 the.1 tut. | 1 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Dimensional analysis | A1,A2, B1,B2 | 32 the.1 tut. | 2-3 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Pressure measurements | A1,A2,A4,B1, B2 | 32 the.1 tut. | 4-5 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Linear & average velocities for Laminar and turbulent flow | A2,A3, B1, B2 | 32 the.1 tut. | 6-7 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Velocity distribution for laminar and turbulent flow | A1,A2, B1, B2 | 32 the.1 tut. | 7-8 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Newton law and viscosity | A2,A5, B1,B2  | 32 the.1 tut. | 9-10 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Continuity equation | A2,A5, B1,B2  | 32 the.1 tut. | 11 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Bernoulli equation and modified energy equation | A2,A5, B1,B2 | 32 the.1 tut | 12-16 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Modified Energy and Losses, friction facto | A2,A5, B1,B2 | 32 the.1 tut | 17-20 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Head loss due to friction, fitting, contraction, expansion | A2,A5, B1,B2 | 32 the.1 tut | 21-22 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Flow measurements | A2,A5, B1,B2 | 32 the.1 tut | 23-25 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Pumps | A2,A5, B1,B2 | 32 the.1 tut | 26-28 |
| 1 – 4 of article (10) | 1-9 ofarticle (10) | Packed bed | A2,A5, B1,B2 | 32 the.1 tut | 29-30 |

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| 12. Infrastructure |
| ***Textbook***F.A. Holland and R. Bragg, Fluid Flow for chemical engineers, second edition, 1995.***References***-J.M. Coulson and J.F. Richardson, Fluid flow, heat transfer, and mass transfer, sixth edition, vol. 1, 1999.*Others*1. Notebook prepared by the instructor of the course.
2. Collection of tutorial sheets of solved and unsolved problems and Exams questions
 | Required reading:· CORE TEXTS· COURSE MATERIALS· OTHER |
| Available websites related to the subject | Special requirements (include for example workshops, periodicals, IT software, websites) |
| Field and scientific visits | Community-based facilities(include for example, guestLectures , internship , field studies) |

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| 13. Admissions |
|  | Pre-requisites |
| / | Minimum number of students |
| 40 | Maximum number of students |

***Instructor:***

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