**TEMPLATE FOR COURSE SPECIFICATION**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**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 programme specification.  |

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| College of Engineering  University of Baghdad | ***1. Teaching Institution*** |
| Mechanical Engineering Department (MED) | ***2. University Department/Centre*** |
| **Fluid Mechanics / I – ME202**This course introduces the description of phenomena associated with fluid flow. Topics covered: physical properties of fluids; fluid statics; principles of conservation of mass, energy and momentum; control volume technique; Bernoulli equation; dimensional analysis and similitude; viscous flow in pipes and channels; laminar and turbulent flow; boundary layer theory; drag and lift; Moody diagram; pipe problems; flow and fluid measurements; analysis of pipes and pumps networks. Physical understanding of fluid flows and applications to practical problems will be stressed. The course is designed to provide a background to higher level courses involving fluid flow and heat transfer. The course is taught through 5 hrs per week, 3 theories, 1 tutorial, and 1 experimental.  | ***3. Course title/code& Description*** |
| Mechanical Engineering ( ME ) | ***4. Programme(s) to which it Contributes*** |
| Annual System ;There is only one mode of delivery, which is a “Day Program”. The students are full time students, and on campus. They attend full day program in face-to-face mode. The academic year is composed of 30-week regular subjects.  | ***5. Modes of Attendance offered*** |
| 1st& 2nd / Academic Year 2017 – 2018 | ***6. Semester/Year*** |
| 150 hrs. / 5 hrs. per week | ***7. Number of hours tuition (total)*** |
| April – 3 / 2014 | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** |
| 1. Introduce basic 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. Introduce the principles of viscous flow, boundary layer, drag and lift, primary and secondary losses in pipe flow.
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, and to design and conduct experiments of fluid mechanics.
9. Provide a strong physical and analytical understanding of fluid flows in order to function in the capacity of mechanical engineer in an engineering company dealing with fluid machinery.
10. Provide a background to higher level courses involving fluid flow and head transfer.
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| ***10·Learning Outcomes*** |
| At the end of the class, the student will be able to: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, Metacenter, 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. Formulate and solve incompressible laminar flows for simple parallel flows in Cartesian and polar coordinates.
6. Analyze boundary layer flows over flat plate.
7. Estimate drag and lift forces in laminar and turbulent flows for different immersed bodies.
8. Calculate frictional losses in pipe problems for both laminar and turbulent flows, by using Moody Diagram.
9. Calculate secondary ( minor ) losses for various pipes fittings and connections.
10. Know how to measure flow properties ( pressure, velocity, discharge ) and fluid properties ( density and viscosity ).
11. Be able to analyze and design pipes network and connection, and pumping stations and connection.
12. Be able to apply modern knowledge and to apply mathematics, science, engineering and technology to fluid mechanics problems and applications.
13. Design and conduct experiments of fluid mechanics, as well as analyze, interpret data and apply the experimental results for the services.
14. Work in groups and function on multi-disciplinary teams.
15. Identify, formulate and solve engineering fluid mechanics problems.
16. Understand professional, social and ethical responsibilities.
17. Communicate effectively.
18. Use the techniques, skills, and modern engineering tools necessary for engineering practice in fluid mechanics applications.
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| ***11.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. Field Trips.
9. Extracurricular Activities.
10. Seminars.
11. In- and Out-Class oral conservations.
12. Reports, Presentations, and Posters.
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| ***12. Assessment Methods***  |
| 1. Examinations, Tests, and Quizzes.
2. Extracurricular Activities.
3. Student Engagement during Lectures.
4. Responses Obtained from Students, Questionnaire about Curriculum andFaculty Member( Instructor ).

***13. Grading Policy***1. Quizzes:

 - There will be a ( 20 – 25 ) closed books and notes quizzes during the academic year. - The quizzes will count 20% of the total course grade.1. Tests, 2-3 Nos. and will count 10% of the total course grade.
2. Extracurricular Activities, this is optional and will count extra marks ( 1 – 5 % ) for the student, depending on the type of activity.
3. Final Exam:

 - The final exam will be comprehensive, closed books and notes, and will take place on January 2018 from 9:00 AM - 12:00 PM in rooms ( M12 + M13 ) - The final exam will count70% of the total course grade |

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| ***14. Course Structure*** |
| Assessment Method | TeachingMethod | Unit/Module or TopicTitle | LOs( Article 10 ) | Hours | Week |
| 1 – 4 of article (12) | 1-12 of article (11) | Introductory Concepts To Fluid Mechanics | a,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 1 |
| 1 – 4 of article (12) | 1-12 of article (11) | Introductory Concepts To Fluid Mechanics | a,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 2 |
| 1 – 4 of article (12) | 1-12 of article (11) | Fluid Statics : Pressure Distribution In Static Fluids | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 3 |
| 1 – 4 of article (12) | 1-12 of article (11) | Pressure Measurements | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 4 |
| 1 – 4 of article (12) | 1-12 of article (11) | Forces On Immersed Surfaces | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 5 |
| 1 – 4 of article (12) | 1-12 of article (11) | Forces On Immersed Surfaces | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 6 |
| 1 – 4 of article (12) | 1-12 of article (11) | Buoyancy And Floatation | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 7 |
| 1 – 4 of article (12) | 1-12 of article (11) | Buoyancy And Floatation | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 8 |
| 1 – 4 of article (12) | 1-12 of article (11) | Buoyancy And Floatation | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 9 |
| 1 – 4 of article (12) | 1-12 of article (11) | Accelerated Fluid And Relative Motion | b,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 10 |
| 1 – 4 of article (12) | 1-12 of article (11) | Introduction To Fluid Motion | c,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 11 |
| 1 – 4 of article (12) | 1-12 of article (11) | Continuity Equation | c,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 12 |
| 1 – 4 of article (12) | 1-12 of article (11) | Energy Equation | c,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 13 |
| 1 – 4 of article (12) | 1-12 of article (11) | Momentum Equation | c,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 14 |
| 1 – 4 of article (12) | 1-12 of article (11) | Momentum Equation | c,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 15 |
| 1 – 4 of article (12) | 1-12 of article (11) | Dimensional Analysis And Similitude | d,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 16 |
| 1 – 4 of article (12) | 1-12 of article (11) | Dimensional Analysis And Similitude | d,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 17 |
| 1 – 4 of article (12) | 1-12 of article (11) | Dimensional Analysis And Similitude | d,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 18 |
| 1 – 4 of article (12) | 1-12 of article (11) | Laminar Viscous Flow Between Parallel Plates | e,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 19 |
| 1 – 4 of article (12) | 1-12 of article (11) | Laminar Viscous Flow Through Circular Tubes | e,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 20 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory, Drag & Lift | f, g,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 21 |
| 1 – 4 of article (12) | 1-12 of article (11) | Losses In Pipes : Moody Diagram | h, i,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 22 |
| 1 – 4 of article (12) | 1-12 of article (11) | Losses In Pipes : Moody Diagram | h, i,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 23 |
| 1 – 4 of article (12) | 1-12 of article (11) | Losses In Pipes : Moody Diagram | h, i,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 24 |
| 1 – 4 of article (12) | 1-12 of article (11) | Measurements Of Fluid Flow | j,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 25 |
| 1 – 4 of article (12) | 1-12 of article (11) | Measurements Of Fluid Flow | j,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 26 |
| 1 – 4 of article (12) | 1-12 of article (11) | Measurements Of Fluid Flow | j,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 27 |
| 1 – 4 of article (12) | 1-12 of article (11) | Analysis Of Piping And Pumping Networks | k,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 28 |
| 1 – 4 of article (12) | 1-12 of article (11) | Analysis Of Piping And Pumping Networks | k,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 29 |
| 1 – 4 of article (12) | 1-12 of article (11) | Analysis Of Piping And Pumping Networks | k,l,m,n,o,p,q,r | 53 the. 1tut.  1 exp. | 30 |

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| ***15. Infrastructure*** |
| ***Textbook*** * “Fluid Mechanics”; by Victor L. Streeter and E. Benjamin Wylie, First SI Metric Edition, M G. GNW Hill , 1988.
* ***References***
1. “Fundamental of Fluid Mechanics”; by Bruce E. Munson, Theodore H. Okiishi, and Wade W. Huesch, Benjamin Wylie, Sixth Edition, 2009
2. “Fluid Mechanics : Fundamentals and Applications”; by Yunus A. Çengel and John M. Cimbala, M G. GNW Hill Higher Education, 2006
3. “Introductory Fluid Mechanics” ; by Joseph Katz, Cambridge University Press, 2010
4. “Elementary Fluid Mechanics”, by John K. Vennard and Robert L. Streat, 5th ed., John Wiley and Sons, 1976.
5. “Engineering Fluid Mechanics by John A. Robert and Clayton T. Crow, 2nd ed., Houghton Mifflin Coo, 1988.

***Others***1. Notebook prepared by the instructor of the course
2. Collection of sheets of solved and unsolved problems and Exams questions
 | Required reading:· CORE TEXTS· COURSE MATERIALS· OTHER |
| * Laboratory experiments in the ( Fluids Lab ) of the department.
* Available websites related to the subject.
* Extracurricular activities.
 | Special requirements (include for example workshops, periodicals, IT software, websites) |
| * Field and scientific visits.
* Extra lectures by foreign guest lecturers.
 | Community-based facilities(include for example, guestLectures , internship,field studies) |
| ***16. Admissions*** |
| ME101 & ME102 Courses | Pre-requisites |
|  / | Minimum number of students |
| 75 | Maximum number of students |
| ***Instructor:*****Prof. Dr. Ihsan Y. Hussain*****Teaching Assistant:*** **Asst. Prof. Dr. Munther Abdullah**  | ***17. Course Instructors*** |

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