Republic of Iraq

Ministry of Higher Education & Scientific Research

Supervision and Scientific Evaluation Directorate

Quality Assurance and Academic Accreditation

International Accreditation Dept.

Academic Program Specification Form For The Academic Year 2017-2018

Universitiy: Baghdad

College : Engineering

Number Of Departments In The College : 12 Twelve

Date Of Form Completion : April – 3 / 2018

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Dean ’s Name

Date : / 4 / 2018

Signature

Dean ’s Assistant For Scientific Affairs

Date : / / 2018

Signature

The College Quality Assurance And University Performance Manager

Date : / / 2018

Signature

Quality Assurance And University Performance Manager

Date : / / 2018

Signature

**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*** |
| **Aerodynamics / ME409**  The primary goal of this course is to provide an understanding of, and ability to solve and analyze, problems pertaining to the aerodynamics of aircraft. This course introduces the student to the "differential" (as opposed to "integral") analysis of inviscid and viscous fluid motion. The students are expected to attain a detailed understanding of flow kinematics (e.g., streamlines, pathlines, vorticity, rate-of-strain …) and dynamics (the Navier-Stokes and continuity equations, Euler's equations, potential flow theory) and to use these principles for engineering analysis of external fluid flows. | ***3. Course title/code & Description*** |
| B.Sc. in Mechanical Engineering | ***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*** |
| 4th / Academic Year 2017-2018 | ***6. Semester/Year*** |
| 90 hrs. – 3 hrs. per week | ***7. Number of hours tuition (total)*** |
| April – 20 / 2018 | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** | |
| The primary goal of this course is to provide an understanding of, and ability to solve and analyze, problems pertaining to the aerodynamics of aircraft. This course introduces the student to the "differential" (as opposed to "integral") analysis of inviscid and viscous fluid motion. The students are expected to attain a detailed understanding of flow kinematics (e.g., streamlines, pathlines, vorticity, rate-of-strain …) and dynamics (the Navier-Stokes and continuity equations, Euler's equations, potential flow theory) and to use these principles for engineering analysis of external fluid flows. | |

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| ***10·*** ***Learning Outcomes*** |
| As an outcome of completing this course, students will:   1. Be able to understanding the principle concepts of aerodynamics and finding the forces and moments for the flying bodies. 2. Understanding the governing equations of the compressible and incompressible flows and formulates them to solve engineering problems in aerodynamics. 3. Be able to understand the inviscid, incompressible flow for first approximation of the aerodynamic analysis. 4. Understanding the airfoil shapes series and how representing them with thin airfoil theory. 5. Understanding the lifting line theory and formulate this theory to a finite wings. 6. Understanding boundary layer development over flying bodies with different regions laminar, transition and turbulent. 7. Understanding the computational fluid dynamics with emphasis on the Panel method. |
| ***11.*** ***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.  8. Field Trips.  9. Extracurricular Activities.  10. Seminars.  11. In- and Out-Class oral conservations.  12. Reports, Presentations, and Posters. |
| ***12. Assessment Methods***  1. Examinations, Tests, and Quizzes.  2. Extracurricular Activities.  3. Student Engagement during Lectures.  4. Responses Obtained from Students, Questionnaire about  Curriculum and Faculty Member ( Instructor ). |
| ***13. Grading Policy***  1. Quizzes:  - There will be (10 – 15) closed books and notes quizzes during the academic year.  - The quizzes will count 20% of the total course grade.  2. Tests, 2-3 Nos. and will count 10% of the total course grade.  3. Extracurricular Activities, this is optional and will count extra marks (1 – 5 %) for the student, depending on the type of activity.  4. 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 count 70% of the total course grade |

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| ***14. Course Structure*** | | | | | |
| **Assessment**  **Method** | **Teaching**  **Method** | **Unit/Module or**  **Topic Title** | **LOs( Article**  **10 )** | **Hours** | **Week** |
| 1 – 4 of article (12) | 1-12 of article (11) | Introductory Concepts To Aerodynamics | 1,2 | 3 the. | 1 |
| 1 – 4 of article (12) | 1-12 of article (11) | Aerodynamic Forces and Moments | 1,2 | 3 the. | 2 |
| 1 – 4 of article (12) | 1-12 of article (11) | Aerodynamic Forces and Moments | 1,2 | 3 the. | 3 |
| 1 – 4 of article (12) | 1-12 of article (11) | Fundamental Principle and Equations | 1,2 | 3 the. | 4 |
| 1 – 4 of article (12) | 1-12 of article (11) | Fundamental Principle and Equations | 1,2 | 3 the. | 5 |
| 1 – 4 of article (12) | 1-12 of article (11) | Fundamental Principle and Equations | 1,2 | 3 the. | 6 |
| 1 – 4 of article (12) | 1-12 of article (11) | Fundamental Principle and Equations | 1,2 | 3 the. | 7 |
| 1 – 4 of article (12) | 1-12 of article (11) | Inviscid, Incompressible Flow | 3 | 3 the. | 8 |
| 1 – 4 of article (12) | 1-12 of article (11) | Inviscid, Incompressible Flow | 3 | 3 the. | 9 |
| 1 – 4 of article (12) | 1-12 of article (11) | Inviscid, Incompressible Flow | 3 | 3 the. | 10 |
| 1 – 4 of article (12) | 1-12 of article (11) | Inviscid, Incompressible Flow | 3 | 3 the. | 11 |
| 1 – 4 of article (12) | 1-12 of article (11) | Inviscid, Incompressible Flow | 3 | 3 the. | 12 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Airfoil | 4 | 3 the. | 13 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Airfoil | 4 | 3 the. | 14 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Airfoil | 4 | 3 the. | 15 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Airfoil | 4 | 3 the. | 16 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Airfoil | 4 | 3 the. | 17 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Finite Wing | 5 | 3 the. | 18 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Finite Wing | 5 | 3 the. | 19 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Finite Wing | 5 | 3 the. | 20 |
| 1 – 4 of article (12) | 1-12 of article (11) | Incompressible Flow over Finite Wing | 5 | 3 the. | 21 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory | 6 | 3 the. | 22 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory | 6 | 3 the. | 23 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory | 6 | 3 the. | 24 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory | 6 | 3 the. | 25 |
| 1 – 4 of article (12) | 1-12 of article (11) | Boundary Layer Theory | 6 | 3 the. | 26 |
| 1 – 4 of article (12) | 1-12 of article (11) | Computational Fluid Dynamics | 7 | 3 the. | 27 |
| 1 – 4 of article (12) | 1-12 of article (11) | Computational Fluid Dynamics | 7 | 3 the. | 28 |
| 1 – 4 of article (12) | 1-12 of article (11) | Computational Fluid Dynamics | 7 | 3 the. | 29 |
| 1 – 4 of article (12) | 1-12 of article (11) | Computational Fluid Dynamics | 7 | 3 the. | 30 |

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| ***15. Infrastructure*** | | |
| ***Textbook***   * John D. Anderson**, “Fundamental of Aerodynamics”;** third Edition, McGraw Hill , 2005.   ***References***   * E.L. Houghton and P.W. Carpenter, “**Aerodynamics for Engineering Students**”, 5th ed., Butterworth-Heinemann, 2003. * Arnold M. Kuethe and Chuen-Yen Chow, “ **FOUNDATIONS OF AERODYNAMICS Bases of Aerodynamic Design**", 5nd ed., John Wiley & Sons Inc.,1998.   ***Others***   * Notebook prepared by the instructor of the course * Collection of sheets of solved and unsolved problems and Exams questions | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | |
| Laboratory experiments in the (Aero. 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 to Airports.  Extra lectures by foreign guest lecturers. | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| ***16. Admissions*** | | |
| **ME202 & ME302 & ME309** | | Pre-requisites |
| / | | Minimum number of students |
| 30 | | Maximum number of students |
| **Asst. Prof. Dr. Anmar Hamid Ali**  **Lecturer of Mechanical Engineering / Aeronautical**  **Mech. Engr. Dept.**  **College of Engineering**  **University of Baghdad**  **Tel: +00964-7801867273**  Email: aha\_has@yahoo.com | | ***17. Course Instructors*** |