**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 program specification. |

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| College of Engineering  University of Baghdad | ***1. Teaching Institution*** |
| Mechanical Engineering Department (MED) | ***2. University Department/Centre*** |
| Internal Combustion Engines ME404 | ***3. Course title/code & Description*** |
| Mechanical Engineering ( ME ) | ***4. Programme(s) to which it Contributes*** |
| Full time campus attendance | ***5. Modes of Attendance offered*** |
| 2017/2018 | ***6. Semester/Year*** |
| 2 | ***7. Number of hours tuition (total)*** |
| 20/10/2017 | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** | |
| 1- Recognize the basic types of internal combustion engines.  2- Estimate the performance of internal combustion engines  3- Know the fundamental thermochemistry as applied to fuels.  4- Follow the various operational processes from intake to exhaust.  5- Be familiar with cooling and lubrication systems. | |

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| ***10·*** ***Learning Outcomes*** |
| At the end of the class, the student will be able to:   1. Differentiate among different internal combustion engine designs 2. Recognize and understand reasons for differences among operating characteristics of different engine types and designs 3. Given an engine design specification, predict performance and fuel economy trends with good accuracy 4. Based on an in-depth analysis of the combustion process, predict concentrations of primary exhaust pollutants 5. Exposure to the engineering systems needed to set-up and run engines in controlled laboratory environments 6. Develop skills to run engine dynamometer experiments 7. Learn to compare and contrast experimental results with theoretical trends, and to attribute observed discrepancies to either measurement error or modeling limitations 8. Develop an understanding of real world engine design issues 9. Develop an ability to optimize future engine designs for specific sets of constraints (fuel economy, performance, emissions) 10. Through the use of both theoretical techniques and experimentation, develop an appreciation for theoretical and practical limits to engine performance and fuel economy. |
| ***11.*** ***Teaching and Learning Methods*** |
| 1. Lectures, exercises, project work, lecturing in English language. 2. Compulsory assignments 3. Exercises |
| ***12. Assessment Methods*** |
| A personal home work is asked on a topic chosen in a list. The assessment consists in the personal home work (10%), a written examination (20%) and final examination (35%).  ***13. Grading Policy***   1. Homework, term Tests and quizzes 30 % 2. Final exam 70 % |

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| ***14. Course Structure*** | | | | | |
| Assessment Method | Teaching  Method | Unit/Module or Topic Title | LOs  ( Article 10 ) | Hours | Week |
| Quizzes | Lecture | Principles of SI and CI engine operation | 1 | 2 | 1 |
| Quizzes | Lecture | 2-stroke engines, 4-stroke engines | 1 | 2 | 2 |
| Quizzes | Lecture | Engine Design and Operating Parameters | 1 | 2 | 3 |
| Quizzes | Lecture | Air-Standard Cycles | 2 | 2 | 4 |
| Quizzes | Lecture | Ideal standard cycles, thermal efficiencies, comparison, deviations | 2 | 2 | 5 |
| Quizzes | Lecture | Classification of engine fuels | 2 | 2 | 6 |
| Quizzes | Lecture | Characteristics of engine fuels, knock resistance | 3 | 2 | 7 |
| Quizzes | Lecture | Ignition tendency | 3 | 2 | 8 |
| Quizzes | Lecture | Combustion chemistry | 3 | 2 | 9 |
| Quizzes | Lecture | Air excess ratio | 4 | 2 | 10 |
| Quizzes | Lecture | Calorific value | 4 | 2 | 11 |
| Quizzes | Lecture | Examination | 4 | 2 | 12 |
| Quizzes | Lecture | Adiabatic flame temperature | 5 | 2 | 13 |
| Quizzes | Lecture | Dissociation | 5 | 2 | 14 |
| Quizzes | Lecture | Real engine strokes | 5 | 2 | 15 |
| Quizzes | Lecture | Induction stroke, volumetric efficiency | 6 | 2 | 16 |
| Quizzes | Lecture | Half – year break | 6 | 2 | 17 |
| Quizzes | Lecture | Examination | 6 | 2 | 18 |
| Quizzes | Lecture | Compression stroke, combustion in SI engines and influencing parameters | 7 | 2 | 19 |
| Quizzes | Lecture | Abnormal combustion, parameters influencing knock and early ignition | 7 | 2 | 20 |
| Quizzes | Lecture | Combustion in CI engines, parameters influencing ignition delay | 7 | 2 | 21 |
| Quizzes | Lecture | Expension and exhaust strokes, exhaust emissions | 8 | 2 | 22 |
| Quizzes | Lecture | Mixture preparation in SI engines | 8 | 2 | 23 |
| Quizzes | Lecture | Carburetor fundamentals | 8 | 2 | 24 |
| Quizzes | Lecture | Fuel injection | 9 | 2 | 25 |
| Quizzes | Lecture | Control of A/F ratio | 9 | 2 | 26 |
| Quizzes | Lecture | Fuel injection systems in Diesel engines, Atomization, | 9 | 2 | 27 |
| Quizzes | Lecture | Combustion chamber types in Diesel engines | 10 | 2 | 28 |
| Quizzes | Lecture | Engine characteristics and performance | 10 | 2 | 29 |
| Quizzes | Lecture | Review | 10 | 2 | 30 |

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| ***15. Infrastructure*** | | |
| ***Textbook***   * **Heywood, J.B., Internal Combustion Engine Fundamentals, McGraw Hill Book Company, New York, 1988** * ***References***  1. Pulkrabek, W.W., Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall, New Jersey, 1997. 2. Stone, R., Introduction to Internal Combustion Engines, Macmillan, London, 1994.   ***Others*** | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | |
| * . | Special requirements (include for example workshops, periodicals, IT software, websites) | |
| * . | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| ***16. Admissions*** | | |
|  | | Pre-requisites |
|  | | Minimum number of students |
|  | | Maximum number of students |
| ***Instructor:Asst. Prof. Dr. Munther Abdullah***    ***Teaching Assistant:*** | | ***17. Course Instructors*** |

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