Republic of Iraq

Ministry of Higher Education & Scientific Research

Supervision and Scientific Evaluation Directorate

Quality Assurance and Academic Accreditation

InternationalAccreditation Dept.

Academic Program Specification Form For The Academic Year 2017-2018

University: Baghdad

College: Engineering

Number Of Departments InThe College : 12 Twelve

Date Of Form Completion : April – 3 / 2018

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 anddemonstrate 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 EngineeringUniversity of Baghdad | ***1. Teaching Institution*** |
| Mechanical Engineering Department (MED) | ***2. University Department/Centre*** |
| Energy Engineering : **Power plant& Internal combustion engines(ME404)** | ***3. Course title/code& Description*** |
| Mechanical Engineering ( ME ) | ***4. Program (s) to which itContributes*** |
| 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*** |
| 60 hrs. / 2 hrs. per week for Power plant &60 hrs. / 2 hrs. per week for Internal combustion engines | ***7. Number of hours tuition (total)*** |
| April – 3 / 2018 | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** |
| **Power plant**1. Introduce basic definitions and introductory concepts of fluid flow heat transfer and thermodynamics.
2. Introduce the description and thermal analysis of steam power cycles.
3. Introduce the description and thermal analysis of gas power cycles
4. Explain the design concepts of different types of steam generators.
5. Introduce the principles of design of different types of heat exchangers such as condensed, feed water heaters and air heaters.
6. Introduce the design principles of steam turbine.
7. Introduce the principles of hydraulic power plants.
8. Enable the student to understand the solar power plants.
9. Provide a strong physical and analytical understanding of power plantsin order to function in the capacity of mechanical engineer in anengineering company dealing with power generation.

**Internal combustion engines**1. To make students familiar with the design and operating characteristics of modern internal combustion engines.
2. To apply analytical techniques to the engineering problems and performance analysis of internal combustion engines.
3. To study the thermodynamics, combustion, heat transfer, friction and other factors affecting engine power, efficiency and emissions
4. To introduce students to the environmental and fuel economy challenges facing the internal combustion engine
5. To introduce students to future internal combustion engine technology and market trends.
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| ***10·Learning Outcomes*** |
| For Power plant at the end of the class, the student will be able to:1. Define different types of power plants.
2. Calculate and evaluate the thermodynamic charts (T-S and P-V) diagrams for different types of power plants.
3. Be familiar with thermal design of steam generators (water tube boilers).
4. Calculatethe thermal efficiency of power cycles.
5. Be able to analyze and design condensers, heaters, (both water and air).

For Internal combustion engine at completing this module the student should be able to: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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| ***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 aboutCurriculum and Faculty Member ( Instructor ).
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| ***13. Grading Policy***1. Quizzes:
2. There will be a ( 10 –15 ) closed books and notes quizzes during the academic year.The quizzes will count 20% of the total course grade.
3. Tests, 2-3 Nos. and will count 10% of the total course grade.
4. Extracurricular Activities, this is optional and will count extramarks ( 1 – 5 % ) for the student, depending on the type of activity.
5. Final Exam:
6. The final exam will be comprehensive, tables are allowed tobe used, and will take place on January 2018 from 10:00 AM - 12:00 PM in room ( M13 ). The final exam will count 70% of the total course grade.

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| ***14. a- Course Structure (Power plant)*** |
| AssessmentMethod | TeachingMethod | Unit/Module orTopic Title | LOs( Article10 ) | Hours | Week |
|  |  | Introductory concepts |  | 22 the. | 1 |
|  |  | Introductory concepts |  | 2 1 the.1 tut.  | 2 |
|  |  | All types of Steam cycles and combined cycles |  | 22 the. | 3 |
|  |  | All types of Steam cycles and combined cycles |  | 22 the. | 4 |
|  |  | All types of Steam cycles and combined cycles |  | 21 the.1 tut. | 5 |
|  |  | All types of Steam cycles and combined cycles |  | 21 the.1 tut. | 6 |
|  |  | All types of Steam cycles and combined cycles |  | 21 the.1 tut. | 7 |
|  |  | Gas cycles |  | 22 the. | 8 |
|  |  | Gas cycles |  | 22 the. | 9 |
|  |  | Gas cycles |  | 22 the. | 10 |
|  |  | Gas turbine |  | 21 the.1 tut. | 11 |
|  |  | Gas turbine |  | 21 the.1 tut. | 12 |
|  |  | Steam turbine |  | 22 the. | 9 |
|  |  | Steam turbine |  | 22 the. | 9 |
|  |  | Steamturbine |  | 22 tut. | 9 |
|  |  | **Heat exchangers condensers + feed water heaters + air heaters** |  | 22 the. | 9 |
|  |  | **Heat exchangers condensers + feed water heaters + air heaters** |  | 22 the. | 9 |
|  |  | **Heat exchangers condensers + feed water heaters + air heaters** |  | 22 the. | 9 |
|  |  | **Heat exchangers condensers + feed water heaters + air heaters** |  | 22 tut. | 9 |
|  |  | **Steam generators** |  | 22 the. | 9 |
|  |  | **Steam generators** |  | 22 the. | 9 |
|  |  | **Steam generators** |  | 22 the. | 9 |
|  |  | **Steam generators** |  | 22 tut. | 9 |
|  |  | **Hydraulic power plant** |  | 22 the. | 9 |
|  |  | **Hydraulic power plant** |  | 22 the. | 9 |
|  |  | **Hydraulic power plant** |  | 22 tut. | 9 |
|  |  | **Solar power plant** |  | 22 the. | 9 |
|  |  | **Solar power plant** |  | 22 the. | 9 |
|  |  | **Solar power plant** |  | 21 the.1 tut. | 9 |
|  |  | **Solar power plant** |  | 22 tut. | 9 |

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| ***14. b- Course Structure (Internal combustion engines)*** |
| AssessmentMethod | TeachingMethod | Unit/Module orTopic Title | LOs( Article10 ) | Hours | Week |
|  |  | Principles of SI and CI engine operation |  | 2 the. | 1 |
|  |  | 2-stroke engines, 4-stroke engines |  | 2 the. | 2 |
|  |  | Engine Design andOperatingParameters |  | 2 the. | 3 |
|  |  | Air-Standard Cycles |  | 2 the. | 4 |
|  |  | Ideal standard cycles, thermal efficiencies, comparison, deviations |  | 2 the. | 5 |
|  |  | Classification of engine fuels |  | 2 the. | 6 |
|  |  | Characteristics of engine fuels, knock resistance |  | 2 the. | 7 |
|  |  | Ignition tendency |  | 2 the. | 8 |
|  |  | Combustion chemistry  |  | 2 the. | 9 |
|  |  | Air excess ratio |  | 2 the. | 10 |
|  |  | Calorific value |  | 2 the. | 11 |
|  |  | Adiabatic flame temperature |  | 2 the. | 12 |
|  |  | Ddissociation |  | 2 the. | 9 |
|  |  | Real engine strokes |  | 2 the. | 9 |
|  |  | Induction stroke, volumetric efficiency |  | 2 the. | 9 |
|  |  | Compression stroke, combustion in SI engines and influencing parameters |  | 2 the. | 9 |
|  |  | Abnormal combustion, parameters influencing knock and early ignition |  | 2 the. | 9 |
|  |  | Combustion in CI engines, parameters influencing ignition delay |  | 2 the. | 9 |
|  |  | Expension and exhaust strokes, exhaust emissions |  | 2 the. | 9 |
|  |  | Mixture preparation in SI engines |  | 2 the. | 9 |
|  |  | Carburetor fundamentals |  | 2 the. | 9 |
|  |  | Fuel injection |  | 2 the. | 9 |
|  |  | Control of A/F ratio |  | 2 the. | 9 |
|  |  | Mixture preparation in CI engines, injection pumps, injectors |  | 2 the. | 9 |
|  |  | Combustion chamber types in Diesel engines |  | 2 the. | 9 |
|  |  | Engine characteristics and performance |  | 2 the. | 9 |

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| ***15. Infrastructure*** |
| ***References**** Power Plant Theory And Design; by J. Potter
* Pulkrabek, W.W., Engineering Fundamentals of the Internal Combustion Engine, Prentice Hall, New Jersey, 1997

**Others**1. Notebook prepared by the instructor of the course2. Collection of sheets of solved andunsolved problems and Examsquestions | Required reading:· CORE TEXTS· COURSE MATERIALS· OTHER |
| Laboratory experiments in the ( heatLab) of the department.Available websites related to the subject.Extracurricular activities. | Special requirements (include forexample 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*** |
| ME404 | Pre-requisites |
| / | Minimum number of students |
| 60 | Maximum number of students |
| Lecturer Iman Qasem | ***17. Course Instructors*** |