

## Course Description Form

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| <b>1. Course Name:</b>   |  |
| Power Plants   |  |
| <b>2. Course Code:</b>   |  |
| MPAC402  |  |
| <b>3. Semester / Year:</b>   |  |
| Annual System 2024/2025 – 30 weeks   |  |
| <b>4. Description Preparation Date:</b>  |  |
| 23/9/2024  |  |
| <b>5. Available Attendance Forms:</b>  |  |
| 4 hours/week - “theoretical + Practical”   |  |
| <b>6. Number of Credit Hours (Total) / Number of Units (Total)</b>   |  |
| Teaching hours   | credit   |
| Theoretical lectures = 60 hrs  | 4  |
| Practical lab = 60 hrs   | 2  |
| Total hours = 120 hrs  | 6  |
| <b>7. Course administrator's name (mention all, if more than one name)</b>   |  |
| Name: Raof Mohammed Radhi  |  |
| Email: <a href="mailto:raof@uowa.edu.iq">raof@uowa.edu.iq</a> & <a href="mailto:raof@g.uowa.edu.iq">raof@g.uowa.edu.iq</a>                                       |  |
| <b>8. Course Objectives</b>  |  |
| Teaching the student,<br>the steam properties,<br>thermal processes<br>types of boilers<br>fuels and combustion<br>the turbines which needed in air conditioning |  |
| <b>9. Teaching and Learning Strategies</b>   |  |
| <b>Strategy</b>  | Data show lecture with discussion to ensure understanding<br>Video clip during lectures for respective clarification<br>Strong emphasis on scientific visits to related sites<br>Example solving with students participation<br>Tutorial sheet solution as Home work<br>Frequent quizzes to motivate student<br>Lab exam<br>Encourage student to attend seminars & discussion work-shops<br>Students seminars<br>Serious attention for class attendance to reduce “% absences” |

| 10. Course Structure |       |                                   |   |                           |                            |
|----------------------|-------|-----------------------------------|---|---------------------------|----------------------------|
| Week                 | Hours | Required Learning Outcomes        | Unit or subject name  | Learning method           | Evaluation method          |
| 1 - 4                | 8-8   | Student Understanding The lecture | Plant Steam Cycles, Reheat Cycles, Regenerative Cycle, Feed Water Heater, Combined Cycles, Binary Cycle Work on Mercury and Steam Combined Condenser.   | Theoretical And practical | Weekly Quiz and Lab report |
| 6-5                  | 4-4   | Student Understanding The lecture | Introduction to Exchangers, Theoretical Principles, Parallel Flow Heat Exchanger, Counter Flow H.E, Cross Flow H.E, The Log Mean Temperature Difference Method, The NTU Method, Shell and Tubes Heat Exchangers, Condensing, Evaporation. | Theoretical And practical | Weekly Quiz and Lab report |
| 7-11                 | 10-10 | Student Understanding The lecture | Steam Boilers, Kinds, Burner, Air Preheated, Preheated Superheated, Combustion Fuels, Complete Incomplete Combustion, Correct Air/Fuel Ratio, Air Supplied, Heat Generation, Boiler Efficiency, principle.                                | Theoretical And practical | Weekly Quiz and Lab report |
| 12-14                | 6-6   | Student Understanding The lecture | Steam Condensers, Kinetic, Direct Contact Condensers, Surface Condenser, Design, Manufacturing, Efficiency of the Condensers.   | Theoretical And practical | Weekly Quiz and Lab report |
| 15-16                | 4-4   | Student Understanding The lecture | Steam Nozzles, Application, Steam Expansion, Discharge Velocity of Steam Through Nozzles, Values of Critical Pressure, Diameters of Throat and Exit for Maximum   | Theoretical And practical | Weekly Quiz and Lab report |
| 17-18                | 4-4   | Student Understanding The lecture | Turbo-Machinery, Classification, Principles, Theory, Dimensional Numbers.   | Theoretical And practical | Weekly Quiz and Lab report |
| 19-22                | 8-8   | Student Understanding The lecture | The Pumps, Kinds of Pump System Characteristics, Pump Characteristics, Matching Pumps to System Characteristics, Operation of Pumps in series and Parallel, Centrifugal pumps, Hydraulic Characteristics, Cavitation                      | Theoretical And practical | Weekly Quiz and Lab report |
| 23-28                | 12-12 | Student Understanding The lecture | Steam Turbines, The Kinetic Impulse Turbine, Blade Efficiency, Reaction Turbine, Reaction Ratio, Installation   | Theoretical And practical | Weekly Quiz and Lab report |

|       |     |   |  |                                 |                                     |
|-------|-----|---|--|---------------------------------|-------------------------------------|
|       |     |   | Multi Stage Blades<br>Velocity Triangles,<br>Blades Guidance,<br>The Blades<br>,External Guidance,   |                                 | report                              |
| 29-30 | 4-4 | Student<br>Understanding<br>The lecture | Power Plants Systems, Feed<br>Water Cycle, Water Treatm<br>and Testing, Piping System<br>Valves, Globe Valve, C<br>Valve, Chick Valve, Spe<br>Valves, Safety Valves, Cor<br>Systems, Blow<br>Measurement instruments,<br>Goal of Measureme<br>Classifications, Tempera<br>Measurements, Pres<br>Measurements, Disch<br>Measurements, Gas Anal<br>Velocity Measurements, L<br>Recorder, Elect<br>Measurements | Theoretical<br>And<br>practical | Weekly<br>Quiz and<br>Lab<br>report |
|       |     |   |  |                                 |                                     |

### 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

### 12. Learning and Teaching Resources

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|---|--|
| Required textbooks (curricular books, if any)                         | A Textbook of Thermal Engineering" .<br>by R.S. KHURMY and J.K. GUPTA          |
| Main references (sources)   | Engineering an Thermodynamics" Approach<br>"fifth edition<br>by YUNUS A.CENGEL |
| Recommended books and references<br>(scientific journals, reports...) | Applied Thermodynamics<br>Onkar - Singh<br>3rd_Edition                         |
| Electronic References, Websites                                       | 1- WWW.B-OK.ORG<br>2- WWW.BOOKFI.ORG   |