# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| **Module Information**<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | **Drawing of Refrigeration & Air Conditioning Systems** | | | **Module Delivery** | |
| **Module Type** | **Core** | | | ☒ **Theory**<br>☐ **Lecture**<br>☒ **Lab**<br>☐ **Tutorial**<br>☐ **Practical**<br>☐ **Seminar** | |
| **Module Code** | **RAC 302** | | | | |
| **ECTS Credits** | **8** | | | | |
| **SWL (hr/sem)** | **200** | | | | |
| **Module Level** | **Three** | | **Semester of Deliver** | **Five** | |
| **Administering Department** | **PM** | | **College** | **TEMO** | |
| **Module Leader** | **Sohaib Hassan Mohammed** | | **e-mail** | **sohaib.hassan.1983@ntu.edu.iq** | |
| **Module Leader's Acad. Title** | **Assist. Lecturer** | | **Module Leader's Qualification** | **M.Sc** | |
| **Module Tutor** | **Name (if available)** | | **e-mail** | E-mail | |
| **Peer Reviewer Name** | Name | | **e-mail** | E-mail | |
| **Scientific Committee Approval Date** | 01/6/2023 | | **Version Number** | 1.0 | |

| **Relation with other Modules**<br>العلاقة مع المواد الدراسية الأخرى | | | |
|---|---|---|---|
| **Prerequisite module** | None | **Semester** | |
| **Co-requisites module** | None | **Semester** | |

| **Module Aims, Learning Outcomes and Indicative Contents**<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
|---|---|
| **Module Objectives**<br>أهداف المادة الدراسية | 1. To develop student skills, learn and understand design theory through application of techniques.<br>2. To understand the design and maps cooling systems through a specific circuit<br>3. This course deals with the basic concepts of different refrigeration system designs.<br>4. This is the main subject of all engineering plans and designs for refrigeration systems<br>5. To understand the problems and avoid design errors of cooling systems.<br>6. To conduct a structured engineering analysis of the systems design process. |
| **Module Learning Outcomes**<br>مخرجات التعلم للمادة الدراسية | Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.<br>1. Learn how to make an engineering diagram of cooling systems.<br>2. Summarize the design process, the parts of the system, before the implementation process.<br>3. Discuss the interaction and participation of students in the process of drawing and designing the parts of the system.<br>4. Give a description of the scheme and design of the main parts of the system.<br>5. Identify the main parts of the system before starting the design process.<br>6. Discuss planning processes and details of the design process.<br>7. Discuss the details of the design process and draw up the drawing plans of the refrigeration systems. |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following.<br>It is possible to classify the engineering work for the process of designing refrigeration and air conditioning systems. through the following paragraphs:<br>A- Before the design process, the student makes a manual diagram that shows the shape of each part of the system so that the student can understand the work that he will do [15 hrs].<br>B- After completing the drawing of the work plan for the design, the student designs each part of the system separately so that the scheme becomes understandable to the student [15 hrs].<br>C- The student implements the plan on the engineering drawing program specialized in the design process in order to complete the student's vision of the work he is doing [30hrs].<br>D- When the system design process is fully completed, the student executing the design applies it practically to the building for which it is designed |

| Learning and Teaching Strategies<br>استراتيجيات التعلم والتعليم | |
|---|---|
| **Strategies** | Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. |

| Student Workload (SWL)<br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|---|---|---|---|
| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | **48** | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 3 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | **152** | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 10 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | **200** | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | | | | |
| | **Assignments** | 4 | 20% (20) | 3, 6, 9 and 12 | LO #3, #5, #6 and #7 |
| | **Projects / Lab.** | 14 | 20% (20) | Continuous | All |
| | **Report** | | | | |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | LO #1 - #4 |
| | **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | Introduction - Procedure of architectural drawing. |
| **Week 2** | Design and drawing of parts system with accessories of compression refrigeration cycle. |
| **Week 3** | Air-handling unit drawing. |
| **Week 4** | Cooling tower drawing with accessories. |
| **Week 5** | Plan drawing of chilled water. |
| **Week 6** | Drawing of suitable control system with air handling unit. |
| **Week 7** | Duct design. |
| **Week 8** | Intersection in ducts. |
| **Week 9** | Plan drawing of a building with duct as a single line. |
| **Week 10** | Plan drawing of a building with duct as two lines. |
| **Week 11** | Plan drawing of a building with duct with grilles and diffusers. |
| **Week 12** | Valves drawing with their symbols. |
| **Week 13** | Piping system drawing single pipe, double pipe. |
| **Week 14** | **Pipe design of compression refrigeration cycle.** |
| **Week 15** | **Water pipe design of compression refrigeration cycle.** |
| **Week 16** | **Preparatory week before the final Exam.** |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | |
| **Week 2** | |
| **Week 3** | |
| **Week 4** | |
| **Week 5** | |
| **Week 6** | |
| **Week 7** | |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | **Text** | **Available in the Library?** |
| **Required Texts** | Modern Refrigeration and Air-conditioning. | Yes |
| **Recommended Texts** | Hand Book Of Air Condition and Refrigeration. | Yes |
| **Websites** | | |

| Grading Scheme<br>مخطط الدرجات | | | | |
|---|---|---|---|---|
| **Group** | **Grade** | التقدير | **Marks %** | **Definition** |
| **Success Group (50 - 100)** | **A** - Excellent | امتياز | 90 - 100 | Outstanding Performance |
| | **B** - Very Good | جيد جدا | 80 - 89 | Above average with some errors |
| | **C** - Good | جيد | 70 - 79 | Sound work with notable errors |
| | **D** - Satisfactory | متوسط | 60 - 69 | Fair but with major shortcomings |
| | **E** - Sufficient | مقبول | 50 - 59 | Work meets minimum criteria |
| **Fail Group (0 – 49)** | **FX** – Fail | راسب (قيد المعالجة) | (45-49) | More work required but credit awarded |
| | **F** – Fail | راسب | (0-44) | Considerable amount of work required |
| | | | | |

**Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

| Code | Course/Module Title | ECTS | Semester |
|---|---|---|---|
| RAC 302 | Drawing of Refrigeration & Air Conditioning Systems | 8 | 5 |
| **Class (hr/w)** | **Lect/Lab./Prac./Tutor** | **SSWL (hr/sem)** | **USWL (hr/w)** |
| 0 | 3 | 48 | 152 |

**Description**

The course "Drawing of Refrigeration & Air Conditioning Systems" focuses on providing students with the necessary skills to effectively create technical drawings and diagrams related to refrigeration and air conditioning systems. Through this course, students will learn the principles of drawing, including projection methods, dimensioning, and annotations.

The course covers various topics such as drawing components of refrigeration and air conditioning systems, including compressors, condensers, evaporators, and refrigerant lines. Students will also learn about drawing ventilation systems, ductwork, and air distribution components.

Additionally, the course emphasizes the use of computer-aided design (CAD) software and tools for creating accurate and professional drawings. Students will gain practical experience in creating detailed and precise drawings that adhere to industry standards and practices.

By the end of the course, students will be equipped with the necessary skills to produce clear and comprehensive drawings of refrigeration and air conditioning systems, enabling them to effectively communicate design ideas and contribute to the field of HVAC engineering.