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|  | <p>Ministry of Higher Education and Scientific Research - Iraq</p> <p>University of Warith Al_Anbiyaa....<br/>College of Engineering<br/>Oil and Gas Department</p> |  |
|---|---|---|

## MODULE DESCRIPTOR FORM

### نموذج وصف المادة الدراسية

| Module Information                 |                                   |                               |  |
|------------------------------------|-----------------------------------|-------------------------------|--|
| معلومات المادة الدراسية            |                                   |                               |  |
| Module Title                       | <b>Physics and Thermodynamics</b> |                               | Module Delivery  |
| Module Type                        | <b>Basic</b>                      |                               | <input checked="" type="checkbox"/> Theory<br><br><input type="checkbox"/> Lecture<br><br><input type="checkbox"/> Lab<br><br><input checked="" type="checkbox"/> Tutorial<br><br><input type="checkbox"/> Practical<br><br><input type="checkbox"/> Seminar |
| Module Code                        | <b>ENG225</b>                     |                               |  |
| ECTS Credits                       | <b>5</b>                          |                               |  |
| SWL (hr/sem)                       | <b>125</b>                        |                               |  |
| Module Level                       | UGII                              | Semester of Delivery          |  |
| Administering Department           | OGE                               | College                       |  |
| Module Leader                      | Asst.lect Yahya hadi              | e-mail                        | <a href="mailto:Yahya.hadi@uowa.edu.iq">Yahya.hadi@uowa.edu.iq</a>   |
| Module Leader's Acad. Title        | Prof.                             | Module Leader's Qualification | PhD  |
| Module Tutor                       | 2                                 | e-mail                        | E-mail   |
| Peer Reviewer Name                 | Name                              | e-mail                        | E-mail   |
| Scientific Committee Approval Date | 01/06/2023                        | Version Number                | 1.0  |

## Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                             |   |                 |   |
|-----------------------------|---|-----------------|---|
| <b>Prerequisite module</b>  | ENG212  | <b>Semester</b> | 3 |
| <b>Co-requisites module</b> | 1- It provides abroad foundation in the basic of science and engineering. | <b>Semester</b> |   |

## Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|  |   |
|--|---|
| <b>Module Aims</b><br>أهداف المادة الدراسية                      | <ol style="list-style-type: none"> <li>1. The program has a strong emphasis on modern physics and its application to 21st century technology.</li> <li>2. Our program builds on the existing research and teaching strengths of the Physics and Materials Science Division in cross-cutting areas such as novel 21st century materials, materials for energy, macromolecules, quantum mechanics to devices, surfaces, interfaces, and nanostructures, and computation, and is flexible enough to grow together with the research base of our division.</li> </ol> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> <li>1- Graduates will have substantial experience with laboratory methods, data analysis, and computation.</li> </ol>  |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | Engineering physics students will be well equipped to pursue research and development careers in new and emerging technologies such as properties of new materials, quantum electronics, nanofabrication and devices, quantum signal processing and quantum computing, related to emerging advances in electrical, mechanical and petroleum engineering.  |

## Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

|            |                                    |
|------------|------------------------------------|
| Strategies | Active learning techniques methods |
|------------|------------------------------------|

## Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

|  |     |   |     |
|--|-----|---|-----|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطلاب خلال الفصل       | 90  | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطلاب أسبوعيا       | 6   |
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 37  | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 2.5 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | 130 |   |     |

## Module Evaluation

تقييم المادة الدراسية

|                      |              | Time/Number | Weight (Marks)   | Week Due   | Relevant Learning Outcome |
|----------------------|--------------|-------------|------------------|------------|---------------------------|
| Formative assessment | Quizzes      | 2           | 10% (10)         | 5, 10      | LO #1, 2, 10 and 11       |
|                      | Assignments  | 2           | 10% (10)         | 2, 12      | LO # 3, 4, 6 and 7        |
|                      | Projects /   | 1           | 10% (10)         | Continuous | All                       |
|                      | Report       | 1           | 10% (10)         | 13         | LO # 5, 8 and 10          |
| Summative assessment | Midterm Exam | 2 hr        | 10% (10)         | 7          | LO # 1-7                  |
|                      | Final Exam   | 2hr         | 50% (50)         | 16         | All                       |
| Total assessment     |              |             | 100% (100 Marks) |            |                           |

## Delivery Plan (Weekly Syllabus)

## المنهاج الاسبوعي النظري

|         | Material Covered  |
|---------|---|
| Week 1  | History of nature science, electrical, charge, current.   |
| Week 2  | Resistance, resistivity, galvanometer, ammeter, voltmeter.  |
| Week 3  | Simple harmonic motion.   |
| Week 4  | Kinetic and potential energy  |
| Week 5  | Electric and magnetic properties of matter  |
| Week 6  | Insulators, semiconductor, conductor, superconductor.   |
| Week 7  | Diamagnetic, paramagnetic, ferromagnetic  |
| Week 8  | Nanotechnology  |
| Week 9  | Introduction: Zeroth law of thermodynamics: Definition of temperature, Zeroth law concept, Type of thermometers, Type of temperature scales, Kelvin experiment: gas thermometer   |
| Week 10 | Ideal gas Equation: Properties of matter, Temperature effect on matter, Thermal expansion laws<br>Macroscopic description of ideal gas, Derivation of Ideal gas equation  |
| Week 11 | Heat: Heat and internal energy, Units of heat, Mechanical equivalent of heat, Specific heat capacity, Calorimetry, Latent heat<br>Work: State variables, Transfer variables, Work in thermodynamics, PV diagrams, Energy transfer . |
| Week 12 | The 1st law of thermodynamics:<br>Isolated and open systems, Adiabatic processes, Adiabatic free expansion process<br>Isobaric processes, Isochoric processes, Isothermal processes, Thermal expansion                              |
| Week 13 | Engines and refrigerators:<br>Work to heat, Heat engine, Thermal efficiency of heat engine, Heat pump (refrigerators), Refrigerator cycle (Sterling), Coefficient of performance  |
| Week 14 | 2nd law of thermodynamics: Entropy<br>Kelvin-Planck & Clausius forms, Reversible and irreversible processes<br>Carnot engine and theorem, Carnot efficiency   |
| Week 15 | <b>Preparatory week before the final Exam</b>   |
| Week 16 | <b>Preparatory week before the final Exam</b>   |

## Learning and Teaching Resources

## مصادر التعلم والتدريس

|                   | Text  | Available in the Library? |
|-------------------|---|---------------------------|
| Required Texts    | Electric Charge and Field, Guide to Semiconductor Engineering, Magnetic and Electric book. Publish Papers                                     | Yes                       |
| Recommended Texts | Physics text book, Series of nanotechnology   |                           |
| Websites          | Elsevier, Springer, Physics library online, <a href="https://openlibrary.org/subjects/physics">https://openlibrary.org/subjects/physics</a> , |                           |

## Grading Scheme

## مخطط الدرجات

| Group                       | Grade            | التقدير             | Marks (%) | Definition                            |
|-----------------------------|------------------|---------------------|-----------|---------------------------------------|
| Success Group<br>(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<br>(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.