# MODULE DESCRIPTION FORM

# نموذج وصف المادة الدراسية

| Module Information<br>معلومات المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| **Module Title** | **Analog Communications** | | | **Module Delivery** | |
| **Module Type** | **Core** | | | ☒**Theory**<br>☐**Lecture**<br>☒**Lab**<br>☐**Tutorial**<br>☐**Practical**<br>☐**Seminar** | |
| **Module Code** | **UOMU0202044** | | | | |
| **ECTS Credits** | 5 | | | | |
| **SWL (hr/sem)** | 125 | | | | |
| **Module Level** | 2 | | **Semester of Delivery** | **4** | |
| **Administering Department** | CET | | **College** | UOMUS | |
| **Module Leader** | Haider jabber | | e-mail | haider.jabber@uomus.edu.iq | |
| **Module Leader's Acad. Title** | | | **Module Leader's Qualification** | | |
| **Module Tutor** | | | **e-mail** | haider.jabber@uomus.edu.iq | |
| **Peer Reviewer Name** | | | **e-mail** | | |
| **Scientific Committee Approval Date** | 1/10/2025 | | **Version Number** | 1.0 | |

| Relation with other Modules<br>العلاقة مع المواد الدراسية الأخرى | | | |
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| **Prerequisite module** | **UOMU022035** | **Semester** | 3 |
| **Co-requisites module** | None | **Semester** | |

| Module Aims, Learning Outcomes and Indicative Contents<br>أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | |
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| **Module Aims**<br>أهداف المادة الدراسية | 1. Understanding the modulation and de-modulation<br>2. Viewing and knowledge Amplitude modulation and Frequency modulation.<br>3. Analyzing the advantage and disadvantage of AM over FM.<br>4. Analyzing the generation and detection each of AM and FM.<br>5. To develop problem solving skills and understanding of PM equations |
| **Module Learning Outcomes**<br>مخرجات التعلم للمادة الدراسية | 1. Recognize Basic Principles of modulation and de-modulation<br>2. Explain the Need for Modulation.<br>3. Define a Carrier Wave, Radio Frequency Spectrum, Sound and Radio Broadcasting<br>4. Identify Amplitude Modulation, Percent Modulation, Upper and Lower Sidebands<br>5. Explain Methods of Modulation.<br>6. Mathematical Analysis of a Modulated Carrier Wave<br>7. Discuss forms of Amplitude Modulation and Methods of Amplitude Modulation.<br>8. Describe the Power Relation in an AM Wave.<br>9. Identify modulating Amplifier Circuit: AM- Transmitter & Radio Receiver Essential Parameter<br>10. Explain the AM generation of SSB, DSB-SC balanced modulators (Cowan &Ring).<br>11. Summarize various demodulation type of AM Signal: AM-Detector (Envelope & Synchronous)<br>12. Identify the Frequency Modulation Process: Modulation Index, Deviation Ratio, Percent Modulation and FM Sidebands.<br>13. Discuss the relationship between the modulation index and number of sidebands.<br>14. List the various types of generation of FM (the direct method and indirect method) & demodulation or detection.<br>15. Identify the comparison between AM and FM.<br>16. Discuss Principles of FM Receiver: FM Discriminator (Foster –Seeley &Ratio Detector).<br>17. Explain the Phase modulation (PM) Definition.<br>18.Discus the PM equation and PM wave forms |
| **Indicative Contents**<br>المحتويات الإرشادية | Indicative content includes the following. |

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| | **Part A –**MODULATION AND DEMODULATION: Need for Modulation,. Define a Carrier Wave, Radio Frequency Spectrum, Sound and Radio Broadcasting. (20 hr)<br>**Part B-** Amplitude Modulation: Percent Modulation, Upper and Lower Sidebands , Methods of Modulation , Mathematical Analysis of a Modulated Carrier Wave, forms of Amplitude Modulation and Methods of Amplitude Modulation, Power Relation in an AM Wave,. Identify modulating Amplifier Circuit: AM- Transmitter & Radio Receiver Essential Parameter, The AM generation of SSB, DSB-SC balanced modulators (Cowan &Ring), demodulation type of AM Signal: AM-Detector (Envelope & Synchronous) ( 30hr)<br>**Part C** Frequency Modulation Process: Modulation Index, Deviation Ratio, Percent Modulation and FM Sidebands, the relationship between the modulation index and number of sidebands, generation of FM (the direct method and indirect method) & demodulation or detection, the comparison between AM and FM, FM Receiver :FM Discriminator (Foster –Seeley &Ratio Detector), the Phase modulation (PM) Definition and the PM equation and PM wave forms.(24 hr) |

## Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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| **Strategies** | 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 type of simple experiments involving some sampling activities that are interesting to the students. |

## Student Workload (SWL)
الحمل الدراسي للطالب موزع على (15) اسبوع

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| **Structured SWL (h/sem)**<br>الحمل الدراسي المنتظم للطالب خلال الفصل | 64 | **Structured SWL (h/w)**<br>الحمل الدراسي المنتظم للطالب أسبوعيا | 4.26 |
| **Unstructured SWL (h/sem)**<br>الحمل الدراسي غير المنتظم للطالب خلال الفصل | 61 | **Unstructured SWL (h/w)**<br>الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4.06 |
| **Total SWL (h/sem)**<br>الحمل الدراسي الكلي للطالب خلال الفصل | 125 | | |

| Module Evaluation<br>تقييم المادة الدراسية | | | | | |
|---|---|---|---|---|---|
| | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 10% (10) | 5, 10 | LO #1-6 , LO #6-11 |
| | **Assignments** | 2 | 10% (10) | 2, 12 | LO # 1,2 , LO #3-11 |
| | **Projects / Lab.** | 1 | 10% (10) | Continuous | |
| | **Report** | 1 | 10% (10) | 13 | LO # 1-14 |
| **Summative assessment** | **Midterm Exam** | 2 hr | 10% (10) | 7 | LO # 1-8 |
| | **Final Exam** | 4hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) | | |

| Delivery Plan (Weekly Syllabus)<br>المنهاج الاسبوعي النظري | |
|---|---|
| | Material Covered |
| **Week 1** | MODULATION AND DEMODULATION: Forms of Amplitude Modulation , Methods of Amplitude Modulation |
| **Week 2** | Carrier Wave, Radio Frequency Spectrum, Sound, Radio Broadcasting |
| **Week 3** | Need for Modulation, |
| **Week 4** | Methods of Modulation: |
| **Week 5** | Amplitude Modulation<br>Percent Modulation, Upper and Lower Sidebands, |
| **Week 6** | Mathematical Analysis of a Modulated Carrier Wave. Power Relation in an AM Wave, |
| **Week 7** | **Midterm Exam** |
| **Week 8** | Modulating Amplifier Circuit: AM- Transmitter |
| **Week 9** | Radio Receiver Essential Parameter |
| **Week 10** | Generation of SSB, DSB-SC Balanced Modulators :(Cowan &Ring )<br>Demodulation of AM Signal: AM-Detector (Envelope & Synchronous |
| **Week 11** | Frequency Modulation: Modulation Index, Deviation Ratio , Percent Modulation, FM Side bands<br>FM Receiver :FM Discriminator (Foster –Seeley &Ratio Detector), |
| **Week 12** | Modulation Index and Number of Side bands,<br>Demodulation or Detection, Comparison between AM and FM, The Four Fields of FM |
| **Week 13** | FM Generation (Direct& Indirect Method) |
| **Week 14** | Phase modulation (PM) Definition |
| **Week 15** | PM equation and PM wave forms |

| Delivery Plan (Weekly Lab. Syllabus)<br>المنهاج الاسبوعي للمختبر | |
|---|---|
| | **Material Covered** |
| **Week 1** | Lab 1: Methods of Modulation Process and why modulation |
| **Week 2** | Lab2: Demodulation methods Process and detection. |
| **Week 3** | Lab 3:Methods of Amplitude Modulation |
| **Week 4** | Lab4: Calculating the time and a frequency of carrier wave |
| **Week 5** | Lab 5: Calculating of Index Modulation AM and Percent Modulation. |
| **Week 6** | Lab 6:Calculating of Upper and Lower Side bands frequencies of AM |
| **Week 7** | Lab 7: Modulation AM wave. |
| **Week 8** | Lab 8:Calculating power content of AM |
| **Week 9** | Lab 9: DE-modulation wave of AM |
| **Week 10** | Lab 10:Frequency modulation Process |
| **Week 11** | Lab 11:Calculating the maximum and minimum frequency |
| **Week 12** | Lab 12: Calculating carrier frequency of FM |
| **Week 13** | Lab 13: Index Modulation and Percent Modulation of FM |
| **Week 14** | Lab 14: Modulation wave of FM |
| **Week 15** | Lab 15: De-Modulation wave of FM |

| Learning and Teaching Resources<br>مصادر التعلم والتدريس | | |
|---|---|---|
| | Text | **Available in the Library?** |
| **Required Texts** | Principles of Communication Systems By J.S.Chitode, First Edition-2007<br>Modern Digital and Analog Communication Systems ,By B.P.Lathi OXFORD | Yes |
| **Recommended Texts** | Analog and Digital Communications, By Schaum Second Edition<br>Data Communications and Networking, By Behrouz A. Forouzan, Fifth Edition | No |
| **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 |
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**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.