

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

| Module Information | | | |
|------------------------------------|-------------------------------------|-------------------------------|--|
| معلومات المادة الدراسية | | | |
| Module Title | Statistical and Optimization | | Module Delivery |
| Module Type | Basic | | <input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar |
| Module Code | STOP216 | | |
| ECTS Credits | 5 | | |
| SWL (hr/sem) | 125 | | |
| Module Level | UGII | Semester of Delivery | 1 |
| Administering Department | PE | College | OGE |
| Module Leader | Asst.lect. Ali Khaleel Faraj | e-mail | 150103@uotechnology.edu.iq |
| Module Leader's Acad. Title | Lecturer | Module Leader's Qualification | Ph.D. |
| Module Tutor | 2 | e-mail | E-mail |
| Peer Reviewer Name | Dr. Fadhil S. Kadhim | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |

| Relation with other Modules | | | |
|-----------------------------------|---------|----------|---|
| العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | CALC123 | Semester | 2 |
| Co-requisites module | None | Semester | |

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

| | |
|--|--|
| Module Aims أهداف المادة الدراسية | Foundation material in probability and statistical inference. Topics include sample spaces, conditional probability, random variables, discrete and continuous probability distributions, expectation, estimation, and hypothesis testing as well as Simple linear regression, model and equation. |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | 1- Learn the language and core concepts of probability theory. 2- Use software and simulation to do statistics. 3- Become an informed consumer of statistical information. |
| Indicative Contents المحتويات الإرشادية | 1- Dealing with numbers and variables and identifying the methods of dealing with them. Studying Central tendency measures as important tools in dealing with many variables Define the Probability theories and determine how to deal with all variables according to the correct method of probability, and using suitable methods to deal with methods of continuous and discrete variables. 2- Using suitable software to deal with the large number of variables of all kinds. Recognition through exercise to determine the quality of variables and calculate central tendency measures and measures of variation. 3- Finding the relationship between dependent and independent variables and construct the correlation coefficient and degree of correlation as well as the studying the regression models and determining the equation. learning how to draw the relationship of the different variables. |

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

| | |
|-------------------|--|
| Strategies | As a basic strategy .. students try through this course to identify the correct statistical methods in dealing with the numbers and the multi variables that they might deal with regarding of oil and gas engineering applications, in addition to studying the systems, concepts and theories of probability through which it can infer accurate facts and information which will be highly beneficial in their field and its practical applications through the use of a set of specialized software. |
|-------------------|--|

| Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
|--|-----|---|---|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا | 5 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل | 47 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل | 125 | | |

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

| Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري | |
|---|--|
| | Material Covered |
| Week 1 | Introduction and Fundamental elements of statistics. |
| Week 2 | Types of data, Methods of describing data. |
| Week 3 | Measures of central tendency. |
| Week 4 | Measures of variation. |
| Week 5 | Probability and Discreet of random variable. |
| Week 6 | Probability and Continuous random distribution. |
| Week 7 | Normal Distribution. |
| Week 8 | Applications . |

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|----------------|---|
| Week 9 | Testing of Hypothesis. |
| Week 10 | Traditional Methods. |
| Week 11 | z Test for a Mean and Chi-square |
| Week 12 | Simple linear regression. |
| Week 13 | The coefficient of correlation. |
| Week 14 | Regression model. |
| Week 15 | Regression equation. |
| Week 16 | Preparatory week before the final Exam |

| Learning and Teaching Resources مصادر التعلم والتدريس | | |
|---|---|---------------------------|
| | Text | Available in the Library? |
| Required Texts | Allan G. Bluman, 2007. Elementary Statistics: step by step approaches , Mc. Graw Hill, 7th edition. | Not sure |
| Recommended Texts | - | |
| Websites | - | |

| Grading Scheme 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.

| Module Information معلومات المادة الدراسية | | | |
|---|--|--------------------------------------|---|
| Module Title | Structure geology | | Module Delivery |
| Module Type | Basic | | <input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar |
| Module Code | STGE215 | | |
| ECTS Credits | 4 | | |
| SWL (hr/sem) | 100 | | |
| Module Level | UGII | Semester of Delivery | 1 |
| Administering Department | PE | College | OGE |
| Module Leader | Dr. Mayssaa Ali Al-Bidry | | e-mail mayssaa.a.abdwon @uotechnology.edu.iq |
| Module Leader's Acad. Title | Asst. Professor | Module Leader's Qualification | Ph.D. |
| Module Tutor | 1 | e-mail | Mayssaa.a.abdwon@uotechnology.edu.iq |
| Peer Reviewer Name | Dr. Fadhil S. Kadhim | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |
| Relation with other Modules العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | GEGE122 | Semester | 2 |
| Co-requisites module | None | Semester | |
| Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | | | |
| Module Aims أهداف المادة الدراسية | Explain basic concepts related to structural geology Study the relationship between structure geology and petroleum engineering | | |
| Module Learning Outcomes | * An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. | | |

| | |
|---|---|
| مخرجات التعلم للمادة الدراسية | <p>* An ability to develop the confidence necessary to successfully solve Mathematical problems.</p> <p>* An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.</p> |
| Indicative Contents المحتويات الإرشادية | The outcomes of this course are used to study the stress and ductile deformation, thus understand rock mechanic and relation with petroleum engineering. Also, study the concepts of folds and fractures, thus understand hydrocarbon migration and traps. A successful petroleum engineers needs a broad background, and a willingness to learn and apply a wide range of information and techniques to the problems of finding, developing, and exploiting a petroleum reservoir. |

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

| | |
|-------------------|--|
| Strategies | <ol style="list-style-type: none"> 1- Explain fundamental concepts relevant to structure geology 2- Explain the concepts of stress and brittle deformation 3- Explain the concepts of stress and ductile deformation 4- Explain the fault connectivity during hydrocarbon migration 5- Explain naturally fractured Reservoirs 6- Explain the concepts of folds and hydrocarbon traps |
|-------------------|--|

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

| | | | |
|--|-----|---|---|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل | 78 | Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا | 5 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 22 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 2 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل | 100 | | |

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 / Lab. | 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 | Stress in rocks: Introduction, Traction, Stress components. |
| Week 2 | Stress in two dimensions, Biaxial stress, Uniaxial stress, Pure shear stress, Stress in three dimensions |
| Week 3 | Deformation and strain, homogeneous strain and the strain ellipsoid, strain path, Coaxial and non-coaxial strain accumulation, superimposed strain, |
| Week 4 | Strain quantities: Longitudinal Strain, Volumetric Strain, Angular Strain, Other Strain Quantities |
| Week 5 | Faults: introduction, Fault components/Terminologies, the attitude of fault, classification of fault, Dip Slip Faults, Listric Normal Fault, Strike slip fault, Transfer fault, Tear Fault, Transform fault, Scissors fault |
| Week 6 | Principal stress orientation for three main fault types: Normal Fault systems (Horst and graben and Half-Graben Blocks), Geometric classification of fault, Classification based on rake of net slip, Classification Based on attitude of fault relative to altitude of adjacent beds, Classification Based on fault pattern, Classification Based on angle at which fault dips, Fault activity |
| Week 7 | Geological factors in characterizing fault connectivity during hydrocarbon migration, Parameters characterizing fault connectivity, Parameterization of geological factors controlling fault connectivity, case study (Effectiveness of selected parameters in assessing fault connectivity), Fault traps |

| | |
|----------------|---|
| Week 8 | Joints: introduction, Joint patterns, Master joints, Plumose Structure, Twist hackle, Systematic and Non-systematic Joints, Joint Sets and Joint Systems, Cross-Cutting Relations between Joints, Joint Spacing in Sedimentary Rocks, |
| Week 9 | Origin and interpretation of joints (Joints Related to Uplift and Unroofing, Formation of Sheeting Joints, Natural Hydraulic Fracturing, Stylolite joints), Mechanics of jointing |
| Week 10 | The Nature of Naturally Fractured Reservoirs, Open and healed fractures, naturally fractured reservoirs classification, Fractured Rocks Properties (porosity, permeability, Compressibility) |
| Week 11 | Fold: introduction, Folding processes, Mechanical role of layers: Active / passive folding, Folding mechanisms (Bending, Lithospheric-scale flexures, Buckling (Single layer buckling, Multilayer buckling, Influence of spacing) Flexural Folding. Flowage Folding, Shear Folding, Folding Due to intrusions, Folding Due to Differential Compression, |
| Week 12 | Fold types, Geometric of folded surface, classification of fold based on Shape and orientation, Classification of folds relative to hinge curvature is referred to as bluntness, Classification based on the orientation of the hinge line and the axial plane, Fold axis orientation, Classification based on Interlimb angles, Fold Symmetry |
| Week 13 | Fold dimensions (draw and calculations), Orientation of a plane (dip and strike), Draw and calculations thickness and depth of beds |
| Week 14 | Dom, hydrocarbon traps |
| Week 15 | Structural basin geology |
| Week 16 | Preparatory week before the final Exam |

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

| | Material Covered |
|---------------|--|
| Week 1 | Structural maps |
| Week 2 | Calculation the thickness of layers from maps |
| Week 3 | Calculation the thickness of layers (case one) |
| Week 4 | Calculation the thickness of layers (case two) |

| | |
|---------------|--|
| Week 5 | Calculation the thickness of layers (case three) |
| Week 6 | Calculation the depth of layers (case one , two) |
| Week 7 | Calculation the depth of layers (case three) |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|--------------------------|---|---------------------------|
| Required Texts | Natural Fractured Reservoir Engineering The Nature of Naturally Fractured Reservoirs | No |
| Recommended Texts | Structure geology | No |
| Websites | | |

Grading Scheme

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.

| Module Information معلومات المادة الدراسية | | | |
|---|--|--------------------------------------|--|
| Module Title | Academic English Writing | | Module Delivery |
| Module Type | Support or related learning activity | | <input checked="" type="checkbox"/> Theory <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Lab <input type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar |
| Module Code | ACEW211 | | |
| ECTS Credits | 4 | | |
| SWL (hr/sem) | 100 | | |
| Module Level | UGII | Semester of Delivery | |
| Administering Department | PE | College | OGE |
| Module Leader | Prof. Dr. Najem Al-Rubaiey | e-mail | 100108@uotechnology.edu.iq |
| Module Leader's Acad. Title | Professor | Module Leader's Qualification | Ph.D. |
| Module Tutor | NA | e-mail | E-mail |
| Peer Reviewer Name | Prof. Dr. Fadhil S. Kadhim | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |
| Relation with other Modules العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | ENLA111 | Semester | 1 |
| Co-requisites module | None | Semester | |
| Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | | | |
| Module Aims أهداف المادة الدراسية | Aims and objectives are: 1. to offer a structure approach to writing 2. to acquaint the students with the process of writing 3. to provide practice in basic sentence structure | | |

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|--|---|
| | 4. to develop Grammar and Mechanics skills |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> 1. Be able to express themselves in correct English with correct grammar usage 2. Be able to construct coherent and logically constructed paragraphs 3. Write a sentence that expresses an idea in short (topic sentence) 4. Recognize the various types of supporting evidence to support their topic sentence 5. Limit ideas according to the context |
| Indicative Contents المحتويات الإرشادية | This course concentrates on the paragraph as the basic unit in extended writing. It begins with a review of sentence types, then it takes the students through the way of paragraph development including a topic sentence, supporting evidence and a concluding sentence. This course aims at developing students' writing and guiding students through the logical steps necessary for creating a paragraph. |

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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|-------------------|--|
| Strategies | <p>The methods of instruction may include, but are not limited to:</p> <ol style="list-style-type: none"> 1. Lectures 2. Individual assignments 3. Listening 4. Any active learning method such as: small group, presentations |
|-------------------|--|

Student Workload (SWL)

الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا

| | | | |
|--|-----|---|-----|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل | 63 | Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا | 4 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 37 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 2.4 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل | 100 | | |

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 |
| | Assignments | 2 | 10% (10) | 2, 12 | LO # 3, 4, 5 |
| | Projects | 1 | 10% (10) | Continuous | All |
| | Report | 1 | 10% (10) | 13 | All |
| Summative assessment | Midterm Exam | 2 hr | 10% (10) | 7 | LO # 1-3 |
| | Final Exam | 2hr | 50% (50) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
|---------|---|
| Week 1 | Introduction |
| Week 2 | Paragraph Structure |
| Week 3 | Parts of a paragraph |
| Week 4 | Topic Sentence |
| Week 5 | Exercises on topic sentences |
| Week 6 | Supporting sentences |
| Week 7 | Concluding Sentence |
| Week 8 | Midterm exam |
| Week 9 | Achieving coherence by repetition of key nouns |
| Week 10 | Achieving coherence by Using consistent Pronouns |
| Week 11 | Achieving coherence by using Transition words |
| Week 12 | Achieving coherence by arranging ideas in logical order |

| | |
|----------------|--|
| Week 13 | Supporting Details |
| Week 14 | Facts vs. Opinions |
| Week 15 | Plagiarism |
| Week 16 | Preparatory week before the final Exam |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|--------------------------|--|---------------------------|
| Required Texts | English for Oil and Gas #2 (Oxford English for Careers: Oil and Gas, Lewis Lansford, D'Arcy Vallance, Jon Naunton, and Alison Pohl. Oxford University Press.). | Yes |
| Recommended Texts | Academic Writing from paragraph to essay, Lisa A. Rumisek, Dorothy Zemach. Macmillan, Oxford, 2005 | No |
| Websites | A Practical Guide to Academic Writing for International Students: https://www.routledge.com/rsc/downloads/A_Practical_Guide_to_Academic_Writing_for_International_Students-A_Routledge_FreeBook- FINAL_VERSION .pdf | |

Grading Scheme

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.

| Module Information معلومات المادة الدراسية | | | |
|---|---|--------------------------------------|---|
| Module Title | Computer Programming II | | Module Delivery |
| Module Type | Support or related learning activity | | <input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input checked="" type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar |
| Module Code | COPR214 | | |
| ECTS Credits | 5 | | |
| SWL (hr/sem) | 125 | | |
| Module Level | UGII | Semester of Delivery | |
| Administering Department | PE | College | OGE |
| Module Leader | Salam A. Thajeel | | e-mail E-mail: salam.a.thajil@uotechnology.edu.iq |
| Module Leader's Acad. Title | Asst. Professor | Module Leader's Qualification | Ph.D. |
| Module Tutor | 1 | e-mail | E-mail |
| Peer Reviewer Name | Dr. Fadhil S. Kadhim | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |
| Relation with other Modules العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | COPR115 | Semester | 1 |
| Co-requisites module | None | Semester | |
| Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | | | |

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|--|---|---|---|
| Module Aims أهداف المادة الدراسية | The main objective of this course is to provide a foundation in programming for engineering problem solving using the MATLAB software package. Students will develop the skills analyze and break down an engineering program and solve it algorithmically using MATLAB. After this course, students will have an understanding of various programming constructs and how they can be used to solve a computational problem. | | |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | <ul style="list-style-type: none"> • An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. • An ability to develop the confidence necessary to successfully solve Mathematical problems with a computer. • An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. | | |
| Indicative Contents المحتويات الإرشادية | we will provide students with the skills to create & develop applications using MATLAB , where that allow Engineers to develop engineering applications that run in the Windows environment. MATLAB provides the engineer a programming tool to write simple programs quickly that meet their needs. Example programs written using MATLAB include gas and oil fluid correlations, interpolation software, gas well bottom hole pressure from surface conditions, volumetric reserve calculations, simple log analysis, water pattern analysis and bottom hole pressure analysis, also MATLAB can help you develop predictive maintenance algorithms customized to the specific operational and architectural profile of your equipment. Use Predictive Maintenance Toolbox to design condition indicators and estimate the remaining useful life of your critical equipment like pumps and compressors | | |
| Learning and Teaching Strategies استراتيجيات التعلم والتعليم | | | |
| Strategies | The main strategy that will be adopted in delivering this module is to Encourage students to ask and answer questions, as well as training students to implement many practical exercises in the laboratory (which covers most of what is studied in theoretical lectures), which in turn gives students the ability to carry out the work required of them in the future in their practical life. | | |
| Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا | | | |
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا | 5 |

| | | | |
|--|-----|---|---|
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 47 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 3 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل | 125 | | |

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 / Lab. | 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 | Starting With Matlab: MATLAB windows , Menus and the toolbar , Working in the command window , Arithmetic operations with scalars , Display formats , Elementary math built-in functions, Useful commands for managing variables, Script files and the Editor Debugger, Matlab Help System |
| Week 2 | Vector :Row Vectors, Extracting Bits of a vector, Column Vectors, Transposing, Matrices.vector addressing , Using a colon:in addressing vector , Adding elements to existing variables, Deleting elements, Built-in functions for handling vector , Mathematics With vector: Addition and subtraction , vector multiplication, vector division , |
| Week 3 | Creating Arrays: |

| | |
|----------------|--|
| | Creating a two-dimensional array (matrix) , The transpose operator , Array addressing , Using a colon: in addressing arrays, Adding elements to existing variables, Deleting elements, Built-in functions for handling arrays |
| Week 4 | Mathematics With Array:Addition and subtraction , Array multiplication, Array division , Elementby-element operations , Using arrays in MATLAB built-in math functions,Built-in functions for analyzing arrays, Generation of random numbers |
| Week 5 | Functions:Elementary Functions(log10, log, exp, sqrt), Max, min, mean, all, sort, unique, length, size, sum, abs functions, Polyarea, std (Standard Deviation), roots (Polynomial Roots), polyval, diff functions, Build functions |
| Week 6 | Programming In Matlab: Relational and logical operators, Conditional statements, if constructs(if ... end, if ... else ... end, if ... elseif ... else ... end), Switch statements. The switch case statement, |
| Week 7 | Loops:For Loops, while loop, Break & continue statement. |
| Week 8 | Symbolic toolbox Factor, simplify and Expand the terms, Solving Equations, User-definedfunction (Inline, vectorize), Differentiation(The first derivative, The nth derivative), Integration (Definitive and in-definitive integrals, Multiple integral), Solutions of Differential Equations (First Order Differential Equations, Higher Order Differential Equations), Limits |
| Week 9 | Graphic Plotting functions, Plotting a given data set, Adding (titles, axis labels, and annotations), Multiple data sets in one plot, Multiple Plots in One Figure, Three Dimensional Plot-Surface Generation |
| Week 10 | Polynomials, Curve Fitting, And Interpolation : Polynomials, Curve fitting , Interpolation , Extrapolation |
| Week 11 | Applications and Engineering Problems:Numerical analysis,The Root of The Equation Iteration method, Linear interpolation method, Bisection method, Tangent method (Newton-Raphson method). |
| Week 12 | Solution of System of Equations: The Elimination method, Gauss-Jordan method, Gauss- Seidel Method, Newton-Raphson method. |

| | |
|---|---|
| Week 13 | The solution of Ordinary Differential Equations: The Taylor Series method, The Euler method, The Runge-Kutta method, Method of Solving Higher Order Equations |
| Week 14 | Petroleum Data Science and Machine Learning |
| Week 15 | Apply the fundamental knowledge of mathematics, science & engineering, to solve the real engineering problems |
| Week 16 | Preparatory week before the final Exam |
| Delivery Plan (Weekly Lab. Syllabus) | |
| المنهاج الاسبوعي للمختبر | |
| | Material Covered |
| Week 1 | Starting With MATLAB: MATLAB windows , Menus and the toolbar , Working in the command window , Arithmetic operations (exercises using MATLAB as calculator). |
| Week 2 | Vectors (practical exercises + homework): Row Vectors, Column Vectors, Transposing, Vector addressing , Adding elements to existing variables, Deleting elements, Built-in functions for handling vector , Mathematics With vector: Addition and subtraction , vector multiplication, vector division . |
| Week 3 | Matrices (practical exercises + homework): Creating a two-dimensional array (matrix) , The transpose operator , addressing , Using a colon: in addressing arrays, Adding elements to existing variables, Deleting elements. |
| Week 4 | Mathematics with Matrix (practical exercises + homework): Addition and subtraction, Array multiplication, Array division, element by-element operations. |
| Week 5 | Built in functions (practical exercises + homework): log10, log, exp, sqrt, max, min, mean, all, sort, length, size, sum, abs, polyarea, std (Standard Deviation). |
| Week 6 | Test. |
| Week 7 | Programming In Matlab (practical exercises + homework): Relational and logical operators. Solving simple exercises using script files (Editor). |
| Week8 | Conditional statements (practical exercises + homework): if constructs (if ... end, if ... else ... end, if ... elseif ... else ... end), Switch statement (The switch case statement). |
| Week9 | Loop statements (practical exercises + homework): For Loops, while loop, Break & continue statement. |

| | |
|---------------|--|
| Week10 | User defined functions (practical exercises + homework): Creating a function file, structure of a function file, saving a function file , and using a user-defined function |
| Week11 | Graphic (practical exercises + homework): Plotting functions, Plotting a given data set, Adding (titles, axis labels, and annotations), and multiple data sets in one plot, Multiple Plots in One Figure, Three Dimensional Plot-Surface Generation |
| Week12 | Symbolic toolbox (practical exercises + homework): Factor, simplify and Expand the terms, Solving Equations, User-defined function (Inline, vectorize), Differentiation, Integration, Solutions of Differential Equations (First Order Differential Equations, Higher Order Differential Equations), and Limits. |
| Week13 | Solution of System of Equations (practical exercises + homework): The Elimination method, and Newton-Raphson method. |
| Week14 | Solve some engineering problems using MATLAB |
| Week15 | Preparatory week before the final Exam |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|--------------------------|---|---------------------------|
| Required Texts | 1. RudraPratap: Getting started with MATLAB 7, Oxford Press (Indian edition),2006. 2. Desmond J. Higham and Nicolas J. Higham: Matlab Guide, SIAM, 2000. | yes |
| Recommended Texts | Introduction to MATLAB for Chemical & Petroleum Engineering 2nd Edition by Sam Toan , Hertanto Adidharma , Bahareh Nojabaei | No |
| Websites | | |

Grading Scheme

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.

Module Information

معلومات المادة الدراسية

| | | | | |
|------------------------------------|---------------------------|--------------------------------------|--|---------------------------|
| Module Title | Fluid Mechanics I | | Module Delivery | |
| Module Type | Basic | | <input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar | |
| Module Code | FLME213 | | | |
| ECTS Credits | 5 | | | |
| SWL (hr/sem) | 125 | | | |
| Module Level | UGII | Semester of Delivery | | |
| Administering Department | PE | College | OGE | |
| Module Leader | Dr. Anwar N. Mohammed Ali | | e-mail | 10605@uotechnology.edu.iq |
| Module Leader's Acad. Title | Lecturer | Module Leader's Qualification | Ph.D. | |
| Module Tutor | 1 | | e-mail | 10605@uotechnology.edu.iq |

| | | | |
|--|---|-----------------------|----------------------------|
| Peer Reviewer Name | Dr. Fadhil S. Kadhim | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |
| Relation with other Modules | | | |
| العلاقة مع المواد الدراسية الأخرى | | | |
| Prerequisite module | CALC123 | Semester | 2 |
| Co-requisites module | None | Semester | |
| Module Aims, Learning Outcomes and Indicative Contents | | | |
| أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية | | | |
| Module Aims أهداف المادة الدراسية | This course provides students an information on the principal concepts and methods of fluid mechanics. Topics covered in the course include pressure, hydrostatics, control volume analysis; mass conservation, momentum conservation and energy conservation for moving fluids; viscous fluid flows, flow through pipes; dimensional analysis; boundary layers. Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications. | | |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | 1- To give the student the knowledge in fluid types, physical properties and the consequence of such properties on fluid flow, and types of units and their conversion. 2- To make the students release the forces acting on static fluid. 3- To give knowledge on types of flow and the basic forces acting on simple profiles and shapes in an steady fluid flow. 4- To give knowledge on viscous flow ,friction factor and losses in pipes. | | |
| Indicative Contents المحتويات الإرشادية | Students will work to formulate the models necessary to study, analyze, and design fluid systems through the application of these concepts, and to develop the problem-solving skills essential to good engineering practice of fluid mechanics in practical applications. | | |

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

| | |
|-------------------|---|
| Strategies | <p>Using the following:</p> <ol style="list-style-type: none"> 1- Discussion. 2- Brain storming by encouraging students to produce a large number of ideas about some issue or problem raised during the lecture. 3- Self-learning by teaching the student by his own according to his special abilities and mental and cognitive levels responding to his preferences and interests to achieve development and integration of his capabilities. 4- Cooperative learning by team working. |
|-------------------|---|

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

| | | | |
|--|-----|---|---|
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل | 63 | Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا | 4 |
| Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل | 62 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا | 4 |
| Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل | 125 | | |

Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|-----------------------------|---------------------|-------------|----------------|----------|---------------------------|
| Formative assessment | Quizzes | 2 | 10% (10) | 5, 12 | LO #1 and 4 |
| | Assignments | 2 | 10% (10) | 2, 10 | LO # 1, 3 and 4 |
| | Projects / | - | - | - | - |
| | Report | 1 | 10% (10) | 13 | LO # 1 and 3 |
| Summative | Midterm Exam | 2 hr | 20% (20) | 7 | LO # 1,3 and 4 |

| | | | | | |
|--|---|-----|------------------|----|----------------|
| assessment | Final Exam | 2hr | 50% (50) | 16 | LO # 1,3 and 4 |
| Total assessment | | | 100% (100 Marks) | | |
| Delivery Plan (Weekly Syllabus) | | | | | |
| المنهاج الاسبوعي النظري | | | | | |
| | Material Covered | | | | |
| Week 1 | <u>Introduction</u> Syllabus and References Definition, types of fluids, units and dimensions | | | | |
| Week 2 | <u>Physical Properties</u> dynamic and kinematic viscosity, surface tension, vapor pressure and cavitation. | | | | |
| Week 3 | <u>Static Fluid</u> static fluid and gage measurement. | | | | |
| Week 4 | <u>Static Fluid</u> Application on pressure gage measurement. | | | | |
| Week 5 | <u>Hydrostatic Forces on Submerged Surfaces</u> Hydrostatic Forces on Plane Surfaces, and curved Surfaces . | | | | |
| Week 6 | <u>Hydrostatic Forces on Submerged Surfaces</u> Buoyancy | | | | |
| Week 7 | <u>Dynamic Fluid</u> Definition, Reynolds no. ,types of flow and flow pattern . flow in noncircular duct, and the derivation. | | | | |
| Week 8 | <u>Governing Equations</u> Continuity equation, momentum equation, and energy equation. | | | | |
| Week 9 | <u>Governing Equations</u> Euler equation, Bernoulli equation and its modification | | | | |

| | |
|----------------|---|
| Week 10 | EGL and HGL. |
| Week 11 | <u>Velocity Distribution</u> Derivation of velocity distribution, maximum, average and mean velocity for laminar flow |
| Week 12 | <u>Velocity Distribution</u> Velocity distribution, maximum, average and mean velocity for turbulent flow. Correction factor |
| Week 13 | <u>Friction in Pipes</u> Types of friction, skin friction and derivation of Darcy equation, form friction and its application. |
| Week 14 | <u>Losses in Pipes</u> Major and minor losses. |
| Week 15 | Preparatory week before the final Exam |
| Week 16 | Final Exam |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|--------------------------|--|----------------------------------|
| Required Texts | <ul style="list-style-type: none"> • Streeter, V. "Fluid Mechanics", 6th edition, Mc-Graw Hill, 1975 . • Frank M. White "Fluid Mechanics", 5th edition, McGraw Hill. 1997. • Coulson & Richardson's Chemical Engineering - Vol. 1, Fluid Flow, Heat Transfer and Mass Transfer - 6th edition, Butterworth-Heinemann, 1999. • R. C. Hibbeler "FLUID MECHANICS", 2nd edition in SI units, Pearson Education, 2021. | |
| Recommended Texts | Frank M. White "Fluid Mechanics", 5th edition, McGraw Hill. 1997. | |
| Websites | | |

Grading Scheme

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.

| Module Information | | | | |
|------------------------------------|---------------------------------|----------------------|--|----------------------------|
| معلومات المادة الدراسية | | | | |
| Module Title | Ordinary differential equations | | Module Delivery | |
| Module Type | Basic | | <input checked="" type="checkbox"/> Theory <input type="checkbox"/> Lecture <input type="checkbox"/> Lab <input checked="" type="checkbox"/> Tutorial <input type="checkbox"/> Practical <input type="checkbox"/> Seminar | |
| Module Code | OPDE212 | | | |
| ECTS Credits | 5 | | | |
| SWL (hr/sem) | 125 | | | |
| Module Level | UGII | Semester of Delivery | | 1 |
| Administering Department | PE | College | OGE | |
| Module Leader | Muayad M. Hasan | | e-mail | E-mail |
| Module Leader's Acad. Title | Lecturer | | Module Leader's Qualification | Ph.D. |
| Module Tutor | 2 | | e-mail | E-mail |
| Peer Reviewer Name | Dr. Fadhil S. Kadhim | | e-mail | 150010@uotechnology.edu.iq |
| Scientific Committee Approval Date | 01/06/2023 | | Version Number | 1.0 |

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

| | | | |
|-----------------------------|---------|-----------------|---|
| Prerequisite module | CALC123 | Semester | 2 |
| Co-requisites module | None | Semester | |

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

| | |
|--|--|
| Module Aims أهداف المادة الدراسية | Important objectives of the calculus sequence are to develop and strengthen students' problem-solving skills and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply calculus tools to a variety of problem situations. |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"> 1. Find limits of functions (graphically, numerically, and algebraically) 2. Analyze and apply the notions of continuity and differentiability to algebraic and transcendental functions. 3. Determine derivatives by a variety of techniques including explicit differentiation, implicit differentiation, and logarithmic differentiation. Use these derivatives to study the characteristics of curves. Determine derivatives using implicit differentiation and use them to study the characteristics of a curve. 4. Students will use a variety of methods to solve the Laplace and Poisson equations. 5. Harmonic function characteristics will be examined by the students. 6. The heat and wave equations will be solved, and students will examine their characteristics. 7. The characteristic approach will be used by students to resolve first order partial differential equations. 8. Students will evaluate conservation laws' characteristics. |

| | | | |
|--|--|---|---|
| | 9. Students will examine some other nonlinear PDEs' properties if time allows. | | |
| Indicative Contents المحتويات الإرشادية | 1. To model and comprehend scenarios involving exponential growth or decay and second order physical systems, use established DE types. 2. Use a variety of input functions, such as zero, constants, exponentials, sinusoids, step functions, impulses, and superpositions of these functions, to solve the major equations. 3. Use the characteristic equation, exponential response formula, Laplace transform, convolution integrals, Fourier series, complex arithmetic, parameter variation, elimination, and anti-elimination methods to solve the differential equations mentioned above. 4. Be able to solve linear DEs using the fundamental ideas of linearity, superposition, and the existence and uniqueness of DE solutions. | | |
| Learning and Teaching Strategies استراتيجيات التعلم والتعليم | | | |
| Strategies | <ul style="list-style-type: none"> • Highlight conceptual comprehension. • Assign homework that is difficult and builds on the lessons you gained in class. • Cooperative learning strategies ought to be applied. • Submit intelligent queries. • Put your focus on logical reasoning and practical problem-solving. • Use a range of assessment techniques. | | |
| Student Workload (SWL) الحمل الدراسي للطلاب محسوب لـ ١٥ اسبوعا | | | |
| Structured SWL (h/sem) الحمل الدراسي المنتظم للطلاب خلال الفصل | 78 | Structured SWL (h/w) الحمل الدراسي المنتظم للطلاب أسبوعيا | 5 |
| Unstructured SWL (h/sem) | 47 | Unstructured SWL (h/w) | 2 |

| | | | |
|---|--|--|--|
| الحمل الدراسي غير المنتظم للطلاب خلال الفصل | | الحمل الدراسي غير المنتظم للطلاب أسبوعيا | |
|---|--|--|--|

| | |
|---|-----|
| Total SWL (h/sem) الحمل الدراسي الكلي للطلاب خلال الفصل | 150 |
|---|-----|

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 / Lab. | 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 | - Review of basics of differentiation and integrations |
| Week 2 | - Basic concepts of ordinary differential equation |
| Week 3 | - Methods of solving First order differential equations I |
| Week 4 | - Methods of solving First order differential equations II |
| Week 5 | - Applications of First order differential equations I |
| Week 6 | - Applications of First order differential equations II |
| Week 7 | - Methods of solving Higher order ordinary differential equation I |
| Week 8 | - Methods of solving Higher order ordinary differential equation II |

| | |
|---------|--|
| Week 9 | - Applications of Higher order differential equations I |
| Week 10 | - Applications of Higher order differential equations II |
| Week 11 | - Series solution of differential equations |
| Week 12 | - Power series |
| Week 13 | - Taylor series |
| Week 14 | - Frobenius series |
| Week 15 | - Final Exam |
| Week 16 | - The preparatory week before the Final Exam |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|-------------------|--|---------------------------|
| Required Texts | 1- George B. Thomas, "THOMAS' CALCULUS ", Eleventh Edition 2011, Dorling Kindersley (India). 2- Spiegel, M. R. Schaums outline series, theory and problems of Lablace transform, copy write 1965 by Mc Graw-Hill Inc. 3- Spiegel, M. R. Schaums outline series, theory and problems of Fourier analysis with application to boundary value problem, copy write 1974 by Mc Graw-Hill Inc. | |
| Recommended Texts | 1- Ford , S.R. and Ford , J.R. " Calculus " , (1963) McGraw-Hill. 2- K.Back house and S.P.T. Houldsworth " Pure Mathematics a First Course " (1979) , S1 Edition , Longman Group . 3- Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons. Inc., 9th | |

| | | |
|-----------------|--|--|
| | ed., 2006. | |
| Websites | 1- https://en.wikipedia.org/wiki/Differential_equation 2- https://byjus.com/maths/differential-equation/ | |

Grading Scheme

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.