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

نموذج وصف المادة الدراسية

| Module Information | | | | |
|-----------------------------|--|----------------------|--|----------------------------|
| معلومات المادة الدراسية | | | | |
| Module Title | Reservoir Engineering II (Gas Reservoir) | | Module Delivery | |
| Module Type | Core | | <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 | OGE324 | | | |
| ECTS Credits | 4 | | | |
| SWL (hr/sem) | 100 | | | |
| Module Level | UGIII | Semester of Delivery | | 2 |
| Administering Department | OGE | College | College of Engineering | |
| Module Leader | Sudad Hameed AL-Obaidi | | e-mail | 150078@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 | Name | e-mail | E-mail | |

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|------------------------------------|------------|----------------|-----|
| Scientific Committee Approval Date | 01/06/2023 | Version Number | 1.0 |
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Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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| Prerequisite module | OGE314 | Semester | 5 |
| 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 | Topic including information of gas reservoirs in general, and their characterization and specifications of properties. Starting from basic ideal gas knowledge to real gases then the gases found in reservoirs and how to calculate each property and then calculating the reserves of gas inside each reservoir. And have a basic idea about how to detect these reservoirs and deal with the produced gases afterwards. |
| Module Learning Outcomes مخرجات التعلم للمادة الدراسية | The student after this course must be familiar with <ol style="list-style-type: none"> 1- gas reservoirs in general, and their characterization and specifications of properties. 2- Starting from basic ideal gas knowledge to real gases then the gases found in reservoirs and how to calculate each property and then calculating the reserves of gas inside each reservoir. 3- have a basic idea about how to detect these reservoirs and deal with the produced gases afterwards. 4- Be familiar with gas condensate properties and calculations 5- Students will have learned all about gas reservoirs and the gas properties, how to accumulate, produced and processed 6- They will have the ability to solve material balance and volumetric equation for gas |

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| | 7- will learn how to test wells for gas inspection and be familiar with all gas laws from simple to complicated ones |
| Indicative Contents المحتويات الإرشادية | <p>Indicative content includes the following:</p> <p>Part I: fundamentals of reservoir engineering (20 hrs.)</p> <p>Types of reservoirs then the basic characterization of gas reservoir types</p> <p>Part II: Material Balance equation applications in different types of gas reservoirs (20 hrs.)</p> <p>Part III: Single phase gas reservoirs (30 hrs.)</p> <p>Part IIII: gas condensate reservoirs (30 hrs.)</p> |

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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| Strategies | <p>Encourage students to ask and answer questions, learning how to do the basic material balance calculations as well as presenting their homework and teamwork.</p> <p>Encourage them to work as individuals with their own opinion and perspective and then to work in a team.</p> <p>in addition to many explanatory videos to increase students' knowledge.</p> |
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Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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| 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 | 37 | Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا | 3 |

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| Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل | 100 |
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Module Evaluation

تقييم المادة الدراسية

| | | Time/Number | Weight (Marks) | Week Due | Relevant Learning Outcome |
|----------------------|-----------------|-------------|------------------|-------------|---------------------------|
| Formative assessment | Quizzes | 2 | 10% (10) | 6, 12 | LO #1, 2, 3 and 4 |
| | Assignments | 4 | 10% (10) | 3, 5, 7, 10 | LO # 1, 2, 3 and 4 |
| | Projects / Lab. | 1 | 10% (10) | Continuous | All |
| | Report | 1 | 10% (10) | 15 | LO # 1, 2, 3, 7 |
| Summative assessment | Midterm Exam | 2 hrs. | 10% (10) | 8 | LO # 1, 3 |
| | Final Exam | 2 hrs. | 50% (50) | 16 | All |
| Total assessment | | | 100% (100 Marks) | | |

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

| | Material Covered |
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| Week 1 | Hydrocarbon gases 1- Ideal gases (Boyle's law, Charles equation, Avogadro law) |

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| | <p>2- EOS of ideal gases</p> <p>3- Mixture of ideal gases (Dalton's law, amagata law)</p> <p>4- Apparent molecular weight of gas mixture, specific gravity of gases</p> |
| Week 2 | <p>Behavior of real gases</p> <p>1- Review of Gas properties (Bg, Eg, Mg) PVT , Apparent molecular weight, standard volume, z factor, gas specific gravity, specific volume, natural gas compressibility</p> |
| Week 3 | <p>Behavior of real gases</p> <p>2- Phase behavior and types of reservoirs based on PT diagrams</p> <p>3- gas volumetric</p> |
| Week 4 | <p>gas reservoir performance</p> <p>flow regime characteristics and equations (steady, unsteady state)</p> |
| Week 5 | <p>gas reservoir performance</p> <p>flow regime characteristics and equations (pseudo steady flow)</p> |
| Week 6 | calculating IGIP volumetric by method |
| Week 7 | calculating unit recovery from volumetric reservoirs |
| Week 8 | <p>MBE in gas reservoirs</p> <p>1- volumetric gas reservoirs</p> <p>2- linearization of MBE</p> |
| Week 9 | <p>MBE in gas reservoirs</p> <p>3- MBE under water drive</p> |
| Week 10 | <p>wet gas and gas condensate</p> <p>1- field identification of wet gas reservoirs</p> <p>2- gas equivalent of produced condensate and water</p> <p>3- retrograde condensation and retrograde vaporization</p> |
| Week 11 | <p>wet gas and gas condensate</p> <p>4- field identification of retrograde reservoirs</p> <p>5- Initial gas and oil calculations</p> |

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| | 6- Initial gas and oil calculations in high pressure separators 7- performance of Volumetric condensate reservoirs |
| Week 12 | calculations of two-phase derivation factor Part I |
| Week 13 | calculations of two-phase derivation factor Part II |
| Week 14 | transient well testing |
| Week 15 | Gas Production Review pressure types and effect, gas compression, tubing and flowing size and measuring, field operation problems, treatment of natural gas |
| Week 16 | Preparatory week before the final Exam |

Learning and Teaching Resources

مصادر التعلم والتدريس

| | Text | Available in the Library? |
|--------------------------|--|---------------------------|
| Required Texts | - Applied Petroleum Reservoir Engineering, Benjamin Cole Craft, Murray Free Hawkins, Ronald E. Terry, Prentice Hall, 1991 - Oil reservoir engineering - 431 pages | yes |
| Recommended Texts | - Gas reservoir Engineering, John Lee, 1996 - Ahmed, Tarek (2010). Reservoir Engineering Handbook. | yes |
| Websites | https://store.spe.org/Gas-Reservoir-Engineering-P29.aspx https://onepetro.org/books/book/28/Gas-Reservoir-Engineering | |

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 |
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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.

