Environmental Sciences/ B.Sc. in Environmental Sciences قسم/ برنامج :Department

# مواصفات مقرر: الجيولوجيا البحرية

# Course Specification of: Marine Geology

| General information about the course المعلومات العامة عن المقرر | | | | | | |
|---|---|---|---|---|---|---|
| 1. | اسم المقرر<br>Course Title | Marine Geology الجيولوجيا البحرية | | | | |
| 2. | رمز المقرر ورقمه<br>Course Code and Number | ENV242 | | | | |
| 3. | الساعات المعتمدة للمقرر<br>Credit Hours | Credit Hours الساعات المعتمدة | | | | الإجمالي Total |
| | | محاضرات Lecture | عملي Practical | سمنار/تمارين Seminar/Tutorial | تدريب Training | |
| | | 2 | 1 (2) | NA | NA | 3 |
| 4. | المستوى والفصل الدراسي<br>Study Level and Semester | 2nd level/2nd semester | | | | |
| 5. | المتطلبات السابقة المقرر (إن وجدت)<br>Pre-requisites (if any) | PNR112 | | | | |
| 6. | المتطلبات المصاحبة (إن وجدت)<br>Co-requisites (if any) | Non لا توجد | | | | |
| 7. | البرنامج الذي يدرس له المقرر<br>Program (s) in which the course is offered | Environmental Sciences | | | | |
| 8. | لغة تدريس المقرر<br>Language of teaching the course | English + Arabic | | | | |
| 9. | نظام الدراسة<br>Study System | Semesters/ Regular | | | | |
| 10. | مكان تدريس المقرر<br>Location of teaching the course | Faculty of Petroleum and Natural Resources, Sana'a University | | | | |
| 11. | اسم معد(و) مواصفات المقرر<br>Prepared by | Ahmed Saif Al-Mikhlafi, Associate Professor | | | | |
| 12. | تاريخ اعتماد مجلس الجامعة<br>Date of Approval | 2020 | | | | |

## Course Description وصف المقرر

| وصف المقرر ر بالإنجليزية | وصف المقرر ر بالعربية |
|---|---|
| This course is designed primarily for students in Environmental Sciences and other relevant disciplines. However, it provides valuable information for the students in the field of geosciences. This course will cover the formation of ocean basins, ocean geomorphology; sedimentary processes within and on the boundaries of ocean basins; and the past history and | يهدف هذا المقرر الى تدريس الجيولوجيا البحرية لطلاب العلوم البيئية، ومع ذلك فإن المواضيع الذي يتضمنها هذا المقرر يمكن أن يستفاد منها في برامج أخري خصوصا طلاب العلوم الجيولوجية. والمواضيع التي يتطرق اليها هذا المقرر هي تكوين الأحواض المحيطية، جيوموفولوجية البحار، عمليات الترسيب العميقة وعلي الحواف القارية و كذا أهمية البحار لدراسة المناخ القديم للأرض. بالإظافة الي العمليات |

| Prepared by | Head of Department | Quality Assurance Unit | Dean of the Faculty | Dean of the Development & Quality Assurance Center |
|---|---|---|---|---|
| Ahmed Saif Al-Mikhlafi | | Assoc.Prof. Adel Al-Matary | Assoc.Prof. Bassim AlKhirbash | Assoc.Prof. Huda Al-Emad |

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| | |
|---|---|
| **impact of sea level change. In addition to ocean physical processes; and elemental composition of sea water.** | الفيزيائية السـائدة في البحار ودراسـة العناصـر الرئيسة التي تساهم في ملوحة البحار. |

## Course Intended Learning Outcomes (CILOs) مخرجات تعلم المقرر

| | After completing the course, the student will be able to: | بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن: | |
|---|---|---|---|
| **a1** | Express knowledge about the structure, formation and evolution of the ocean basins | يظهر المعرفة لكيفية نشوء و تطور البحار والتضاريس التي تميزها في الداخل. | **a1** |
| **a2** | Describe the physiographic provinces of the oceans and sediment types. | يصف التقسيمات السطحية للأحواض المحيطية وأنواع الرواسب البحرية ومصدرها. | **a2** |
| **b1** | Analyze the role of geology in evolution of coastal zones and morphodynamics. | يحلل الدور االذي يلعبه علم الجيولوجيا في تبيان مراحل تشكل السواحل والربط بين حركة التيارات البحرية وهذه الأشكال. | **b1** |
| **b2** | Synthesize various types of marine environmental data efficiently, and in sustainable way. | ينتج أنواع مختلفة من البيانات التي تعود الي البيئات البحرية بطريقة كفوء ومستدامه. | **b2** |
| **c1** | Practice skills in marine data collection both during field work and in the laboratory. | يمارس المهارات في جمع البيانات البحرية اثناء العمل الحقلي وفي المعمل. | **c1** |
| **c2** | Interpret field and laboratory data and compile these data archives | يفسر البيانات الحقلية والمعملية وحفظها في السجلات. | **c2** |
| **d1** | Function on a multidisciplinary teams and individually. | يعمل ضمن فريق متعدد المهام وبمفرده. | **d1** |
| **d2** | Communicate clearly and ethically, geological knowledge in both oral presentations and written reports | يوصل وبكفاءة المعارف العلمية المكتسبة بطريقة واضحة و ببعد أخلاقي شفويا وتحريريا. | **d2** |

## مواءمة مخرجات تعلم المقرر مع مخرجات التعلم للبرنامج:

Alignment of CILOs (Course Intended Learning Outcomes) to PILOs (Program Intended Learning Outcomes)

| مخرجات التعلم المقصودة من المقرر (Course Intended Learning Outcomes) | | مخرجات التعلم المقصودة من البرنامج (Program Intended Learning Outcomes) (تكتب جميع مخرجات البرنامج كما هي رمزا ونصا) | |
|---|---|---|---|
| **a1** | Express knowledge about the structure, formation and evolution of the ocean basins | **A1** | Show efficiently knowledge and understanding of concepts, principles and theories associated with the basic science and general culture. |
| **a2** | Describe the physiographic provinces of the oceans and sediment types. | **A2** | Define clearly concepts, principles, and terminology related to the environment. |
| **b1** | Analyze the role of geology in evolution of coastal zones and morphodynamics. | **B1** | Practice skillfully the optimal way to scientific thinking and criticizing of environmental issues and related sciences. |
| **b2** | Synthesize various types of marine environmental data efficiently, and in sustainable way. | **B2** | Evaluate efficiently different procedures required for conducting a task in the field, and quick response to any emergency. |

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| | | | |
|---|---|---|---|
| **c1** | Practice skills in marine data collection both during field work and in the laboratory. | **C1** | Use efficiently various sets of tools and modern techniques that used commonly to collect data in the field. |
| **c2** | Interpret field and laboratory data and compile these data archives. | **C2** | Practice the systematic and scientific procedures in researches and practical and field studies by suitable and safe ways. |
| **d1** | Function on a multidisciplinary teams and individually. | **D1** | Employ technology applications and modern communications in enhancing his/her scientific and professional capacities by his/her own. |
| **d2** | Communicate clearly and ethically, geological knowledge in both oral presentations and written reports | **D2** | Conduct actively the tasks assigned to him/her either individually or within a team, taking into account the laws and professional and ethical standards. |

## مواءمة مخرجات التعلم باستراتيجيات التعليم والتعلم والتقويم
Alignment of CILOs to Teaching and Assessment Strategies

### أولا: مواءمة مخرجات تعلم المقرر (المعارف والفهم) باستراتيجية التعليم والتعلم والتقويم:
**First: Alignment of Knowledge and Understanding CILOs**

| مخرجات المقرر/ المعرفة والفهم<br>**Knowledge and Understanding CILOs** | | استراتيجية التعليم والتعلم<br>**Teaching Strategies** | استراتيجية التقويم<br>**Assessment Strategies** |
|---|---|---|---|
| Express knowledge about the structure, formation and evolution of the ocean basins | a1 | -Interactive lectures<br>-Discussion<br>-Brain Storming | -Student presentation<br>- Quizzes<br>- Examination<br>- Reports |
| Describe the physiographic provinces of the oceans and sediment types. | a2 | | |

### ثانيا: مواءمة مخرجات تعلم المقرر (المهارات الذهنية) باستراتيجية التدريس والتقويم:
**Second: Alignment of Intellectual Skills CILOs**

| مخرجات المقرر/ المهارات الذهنية<br>**Intellectual Skills CILOs** | | استراتيجية التعليم والتعلم<br>**Teaching Strategies** | استراتيجية التقويم<br>**Assessment Strategies** |
|---|---|---|---|
| Analyze the role of geology in evolution of coastal zones and morphodynamics. | b1 | -Interactive lectures<br>-Discussion<br>-Brain Storming<br>- Practical work | -Student presentation<br>- Quizzes<br>- Examination<br>- Reports |
| Synthesize various types of marine environmental data efficiently, and in sustainable way. | b2 | | |

### ثالثا: مواءمة مخرجات تعلم المقرر (المهارات المهنية والعملية) باستراتيجية التدريس والتقويم:
**Third: Alignment of Professional and Practical Skills CILOs**

| مخرجات المقرر/ المهارات المهنية والعملية<br>Professional and Practical Skills CILOs | | استراتيجية التعليم والتعلم<br>Teaching Strategies | استراتيجية التقويم<br>Assessment Strategies |
|---|---|---|---|
| Perform interpretation and field and laboratory investigations on collected field data and compile these data archives | c1 | -Interactive lectures<br>-Discussion<br>-Brain Storming<br>- Practical work | -Student presentation<br>- Quizzes<br>- Examination<br>- Reports |
| Interpret field and laboratory data and compile these data archives. | c2 | | |

**رابعا: مواءمة مخرجات تعلم المقرر (المهارات العامة) باستراتيجية التدريس والتقويم:**

**Fourth: Alignment of Transferable (General) Skills CILOs**

| مخرجات المقرر<br>Transferable (General) Skills CILOs | | استراتيجية التعليم والتعلم<br>Teaching Strategies | استراتيجية التقويم<br>Assessment Strategies |
|---|---|---|---|
| Function on a multidisciplinary teams and individually. | d1 | -Interactive lectures<br>-Discussion<br>-Brain Storming<br>- Practical work | -Student presentation<br>- Quizzes<br>- Examination<br>- Reports |
| Communicate clearly and ethically of geological knowledge in both oral presentations and written reports. | d2 | | |

## Course Content محتوى المقرر

### Theoretical Aspect موضوعات الجانب النظري

| الرقم<br>Order | الموضوعات الرئيسة/ الوحدات<br>Topic List / Units | الموضوعات الفرعية<br>Sub Topics List | عدد الأسابيع<br>Number of Weeks | الساعات الفعلية<br>Contact Hours | رموز مخرجات التعلم للمقرر<br>(CILOs) |
|---|---|---|---|---|---|
| 1 | Introduction and course overview | policies & procedures in marine geology | 1 | 2 | a1, a2, b1, b2 |
| 2 | History of marine geology | pre-world war II exploration of the oceans<br>post-world war II exploration of the oceans | 1 | 2 | a1, a2, b1, |
| 3 | Geomorphology of the ocean basins | plate tectonics, general concepts & controls,<br>structure & composition of oceanic basement, | 1 | 2 | a1, a2, b1, b2, , c2, |
| 4 | Ocean basin tectonics | principal features of ocean spreading centers, subduction zones, ophiolite complexes | 1 | 2 | a1, a2, b1, b2, c1, c2, |

| | | | | | |
|---|---|---|---|---|---|
| **5** | Structure and evolution | passive continental margins, active continental margins, type of modern beaches, coastal processes | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **6** | Ocean circulation | waves and currents, coastal geomorphic features | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **7** | Physical Oceanography | temperature, salinity and density of seawater; oceanic heat budget, mixing processes in the oceans | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **8** | Chemical Oceanography | Elemental composition of seawater. Conservative and non-conservative behavior, the concept of salinity | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **9** | Coastal Processes and Landforms | Erosional Landforms<br>Depositional Landforms | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **10** | Ocean Sediments | Sediment types, global distribution of sediments, submarine fans | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **11** | Marine Sedimentation | technique used in sediment retrieval | 1 | 2 | a1, a2, b1, b2, c1, c2 |
| **12** | Marine Resources | Continental Margin Mineral Resources: Petroleum and Natural Gas<br>Deep Sea Minning: Metalliferous Oxides (Ferromanganese nodules) | 1 | 2 | |
| **13** | Introduction to Marine Acoustic Methods | Bathymetric Systems (echo-sounder), sonar-sources, Sub-bottom profiling, side-scan sonar, CDP, migration. | 1 | 2 | a1, a2, b1, b2, c1, c2, |
| **14** | Sea Level Changes | Eustatic Sea Level Changes<br>Isostatic Sea Level Changes<br>Global Warming and Present Sea level Changes | 1 | 2 | a1, a2, b1, b2, , c1, c2,d1 |
| **عدد الأسابيع والساعات الفعلية<br>Number of Weeks /and Contact Hours Per Semester** | | | 14 | 28 | |

**Practical Aspect (if any) الموضوعات العملية (إن وجدت)**

| الرقم<br>Order | التجارب العملية/ التمارين / تدريبات<br>Practical / Exercises/ Tutorials topics | عدد الأسابيع<br>Number of Weeks | الساعات الفعلية<br>Contact Hours | رموز مخرجات التعلم<br>Course ILOs |
|---|---|---|---|---|
| **1** | Art of Navigation: To understand the coordinate system, ship course-plotting on marine charts by using the compass-rose. | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |

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| | | | | |
|---|---|---|---|---|
| | To explain the terms of bearing and heading. Unit conversions: marine velocites, depths and Distances like knots, Nautical mile, fathom .. etc. | | | |
| **2** | Sea Floor Spreading and Plate Tectonics: To illustrate the distribution of the ocean floor major physiographic features and its relationship with sea floor spreading & plate tectonics theories such as volcanoes, hotspots, oceanic trenches and mid oceanic ridges ..etc. | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **3** | Morphology & Geography of the Marine Environments: To ensure that the student be familiar with ocean topography and can draw a cross-section using a bathymetric map. | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **4** | Morphodynamics: major emphases on hydrodynamic effects on the coasts. | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **5** | Marine Earthquakes Magnitude: students are introduced to the earthquake causes and their relation to plate tectonics. Calculate the magnitude of an earthquakes. Locating marine earthquake epicenter | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **6** | Tsunami Waves Records Analysis & Its Warning System (TWS) Mechanism | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **7** | Physical Oceanography: Geographical Distribution of Surface Temperature and Salinity ( Thermocline, Halocline, Pycnocline) | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2 |
| **8** | Chemical Oceanography: lateral and vertical distributions of dissolved elements in the sea. | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **9** | Grain size analysis: Sieve analysis, Pipette, Burette analysis | 2 | 4 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **10** | Seismic data acquisition and processing: seismic record (Ecogram), migration | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **11** | Sea-level Reconstruction: coastal terraces, uplift, and sea level changes | 1 | 2 | a1, a2, b1, b2, c1, c2, d1, d2, |
| **اجمالي الأسابيع والساعات الفعلية<br>Number of Weeks /and Contact Hours Per Semester** | | **12** | **24** | |

## Teaching Strategies استراتيجيات التعليم والتعلم

- Interactive Lecture
- Discussion
- Brain Storming
- Training
- Cooperative Learning

## Tasks and Assignments الأنشطة والتكليفات

| م No | التكليف/ الواجب Assignments/ Tasks | نوع التكليف (فردي/ تعاوني) | الدرجة المستحقة Mark | أسبوع التنفيذ Week Due | مخرجات التعلم CILOs (symbols) |
|---|---|---|---|---|---|
| 1 | Discussion-Participation | individual | 5 | throughout | all |
| 2 | Assignments (topic research) | Both | 5 | W5, W11 | all |
| | Total Score إجمالي الدرجة | | 10/150 | | |

## Learning Assessment تقييم التعلم

| الرقم No. | أنشطة التقييم Assessment Tasks | أسوع التقييم Week due | الدرجة Mark | نسبة الدرجة إلى الدرجة النهائية Proportion of Final Assessment | مخرجات التعلم CILOs (symbols) |
|---|---|---|---|---|---|
| 1 | الأنشطة والتكليفات Tasks and Assignments | varies | 10 | 6.66 % | a1, a2, b1, b2, c1, c2, d1, d2, |
| 2 | Quizzes | W6, W12 | 5 | 3.33 % | a1, a2, b1, b2, c1, c2, d1, d2 |
| 3 | اختبار نصف الفصل ( عملي) Midterm Exam (practical) | W7 | (15) | 10 % | a1, a2, b1, b2, c1, c2, d1, d2, |
| 4 | Midterm Exam (theoretical) اختبار نصف الفصل ( نظري) | W7 | 15 | 10% | a1, a2, b1, b2, c1, c2, d1, d2, |
| 5 | lab activity and participation | throughout | (5) | 3.33 % | a1, a2, b1, b2, c1, c2, d1, d2, |
| 6 | اختبار نهاية الفصل (عملي) Final Exam (practical) | W 14 | (30) | 20% | a1, a2, b1, b2, c1, c2, d1, d2, |
| 7 | اختبار نهاية الفصل (نظري) Final Exam (theoretical) | W16 | 70 | 46.66% | a1, a2, b1, b2, c1, c2, d1, d2 |
| | Total الإجمالي | | 150 | 100% | |

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## Learning Resources مصادر التعلم

توثق المراجع حسب نظام APA (اسم المؤلف، سنة النشر، اسم الكتاب، دار النشر، بلد النشر).

**Required Textbook(s) (لا تزيد عن مرجعين) المراجع الرئيسة**

1. Seibold, E. and Berger, W. (2017) The Sea Floor, An Introduction to Marine Geology, Springer, 4th edition

Erickson, J. (2009) Marine Geology, Exploring the New Frontiers of the Ocean (The Living Earth), Revised Edition, 317p.

**Essential References المراجع المساندة**

*1.* Kennett (1982) Marine Geology, Prentice-Hall Inc., Englewood Cliffs, NJ 813p.

*1.Understanding Earth* by Frank Press and Ray Siever (ISBN 0716731339)

*2. The Ocean Basins: Their Structure and Evolution* published by the Open University (ISBN 0750639830)

3. Morelock, J., and Ramirrez, W. Marine Geology, A digital textbook in PDF format.

**Electronic Materials and Web Sites *etc.* المصادر الإلكترونية ومواقع الإنترنت**

http://geology.uprm.edu/MorelockSite/morelockonline/webresource.htm

## Course Policies الضوابط والسياسات المتبعة في المقرر

| | |
|---|---|
| 1 | **Class Attendance** حضور الفعاليات التعليمية<br>- Attendance is compulsory at all scheduled lectures and practical sessions. A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure and will be required to retake the course again. |
| 2 | **Tardy** الحضور المتأخر<br>- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent. |
| 3 | **Exam Attendance/Punctuality** ضوابط الامتحان<br>- The student should attend the exam on time. He/she is allowed to attend the exam within half an hour from the beginning of the exam, after that if late he/she will not be permitted to take the exam and will be considered as absent. |
| 4 | **Assignments & Projects** التعيينات والمشاريع<br>- Student has to submit all the assignments/reports for checking on time, mostly one week after given the assignment. |
| 5 | **Cheating** الغش<br>- Any student caught cheating will be expelled from the exam hall, and referred to a disciplinary council to apply the penalties as stipulated in the Student Affairs Regulations (SAR). Usually student will be assigned a course grade of F (Fail), more actions will be applied subject to the case in agreement with the SAR. |
| 6 | **Plagiarism** الانتحال<br>- Plagiarism means if you copy the work of another person and turn it in as your own, so plagiarism is one of the worst academic sins.<br>- Academic integrity, with its embodied values, is seen as a foundation of Sana'a University. It is the responsibility of all students to be familiar with behaviours and practices associated with |

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| | academic integrity. Instructors are required to provide students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. Such behavior will lead to severe punishment liable to faculty/department evaluation. |
| 7 | **Other policies** سياسات أخرى<br>- During class lectures, please make sure that all cell phones must be off or on silent and put away in your pocket, or backpack or purse. They should not be visible during class. Audio and/or visual recording devices including, but not limited to, computers, personal digital assistants (PDA's), iPods, tape recorders, and cameras are not permitted to be on-they should be turned off and put away in your pocket, backpack or purse. Failure to comply with these policies will result in exclusion from the class.<br>- Students are not allowed to carry a cell phone or any relevant material into the exam hall, otherwise any such act will be treated as a cheating case, and disciplinary action will be taken according to University rules as above. |

قسم/ برنامج: العلوم البيئية Environmental Sciences

العام الجامعي: 2019- 2020م

# خطة مقرر: الجيولوجيا البحرية

## Course Plan (Syllabus): Marine Geology

| Information about Faculty Member Responsible for the Course معلومات عن أستاذ المقرر | | | | | | | |
|---|---|---|---|---|---|---|---|
| الاسم Name | أحمد سيف المخلافي | الساعات المكتبية (أسبوعيا) Office Hours | | | | 6 hours | |
| المكان ورقم الهاتف Location &Telephone No. | صنعاء +967 777554655 | السبت SAT | الأحد SUN | الاثنين MON | الثلاثاء TUE | الأربعاء WED | الخميس THU |
| البريد الإلكتروني E-mail | ahmedmikhlafi@hotmail.com, ahmed.almikhlafi@fulbrightmail.org | | | | | | |

| General information about the course معلومات عامة عن المقرر | | | | | | |
|---|---|---|---|---|---|---|
| .1 | اسم المقرر Course Title | Marine Geology جيولوجيا بحرية | | | | |
| .2 | رمز المقرر ورقمه Course Code and Number | ENV242 | | | | |
| .3 | الساعات المعتمدة للمقرر Credit Hours | Credit Hours الساعات المعتمدة | | | | الإجمالي Total |
| | | محاضرات Lecture | عملي Practical | سمنار/تمارين Seminar/Tutorial | تدريب Training | |
| | | 2 | 1 | 0 | 0 | 3 |
| .4 | المستوى والفصل الدراسي Study Level and Semester | 2nd level/2nd semester | | | | |
| .5 | المتطلبات السابقة للمقرر Pre-requisites | PNR112 | | | | |
| .6 | المتطلبات المصاحبة (إن وجدت) Co –requisite | Non | | | | |
| .7 | البرنامج الذي يدرس له المقرر Program (s) in which the course is offered | Environmental Sciences | | | | |
| .8 | لغة تدريس المقرر Language of teaching the course | English-Arabia | | | | |
| .9 | مكان تدريس المقرر Location of teaching the course | Petroleum and Natural Resources Building | | | | |

## Course Description وصف المقرر

| Prepared by | Head of Department | Quality Assurance Unit | Dean of the Faculty | Dean of the Development & Quality Assurance Center |
|---|---|---|---|---|
| Ahmed Saif Al-Mikhlafi | | Assoc.Prof. Adel Al-Matary | Assoc.Prof. Bassim AlKhirbash | Assoc.Prof. Huda Al-Emad |

Rector of Sana'a University
Prof. Dr. Al Qaseem Mohammed Abas

| | |
|---|---|
| **This course is a general course, designed primarily for students in Environmental Sciences and other relevant disciplines. However, it provides valuable information for the students in the field of geosciences. This course will cover the formation of ocean basins, ocean geomorphology; sedimentary processes within and on the boundaries of ocean basins; and the past history and impact of sea level change. In addition to ocean physical processes; and elemental composition of sea water.** | هذا المقرر شـــامل يتعلق بتدريس الجيولوجيا البحريـــة لطلاب العلوم البيئيـــة، ومع ذلـك فـإن المواضيع الذي يتضـمنها يمكن أن يستفاد منها في برامج أخري خصـــوصـــا طلاب العلوم الجيولوجية. والمواضيع التي يتطرق اليها هذا المقرر هي تكوين الأحواض المحيطيـــة، جيوموفولوجيـــة البحـــار، عمليات الترســـيب العميقة وعلي الحواف القارية و كذا أهمية البحار لدراســـة المناخ القديم للأرض. بالإظافة الي العمليات الفيزيائية الســـائدة في البحار ودراســـة العناصـــر الرئيســـة التي تســـاهم في ملوحة البحار. |

## Course Intended Learning Outcomes (CILOs) مخرجات تعلم المقرر

| After completing the course, the student will be able to: | | بعد الانتهاء من دراسة المقرر سوف يكون الطالب قادرا على أن: | |
|---|---|---|---|
| a1 | Express knowledge about the structure, formation and evolution of the ocean basins | يظهر المعرفة لكيفية نشؤ و تطور البحار والتضاريس التي تميزها في الداخل. | a1 |
| a2 | Describe the physiographic provinces of the oceans and sediment types. | يصف التقسيمات السطحية للأحواض المحيطية وأنواع الرواسب البحرية ومصدرها. | a2 |
| b1 | Analyze the role of geology in evolution of coastal zones and morphodynamics. | يحلل الدور االذي يلعبه علم الجيولوجيا في تبيان مراحل تشكل السواحل والربط بين حركة التيارات البحرية وهذه الأشكال. | b1 |
| b2 | Synthesize various types of marine environmental data efficiently, and in sustainable way. | ينتج أنواع مختلفة من البيانات التي تعود الي البيئات البحرية بطريقة كفوءه ومستدامه. | b2 |
| c1 | Practice skills in marine data collection both during field work and in the laboratory. | يمارس المهارات في جمع البيانات البحرية اثناء العمل الحقلي وفي المعمل. | c1 |
| c2 | Interpret field and laboratory data and compile these data archives | يفسر البيانات الحقلية والمعملية وحفظها في السجلات. | c2 |
| c3 | Function on a multidisciplinary teams and individually. | يعمل ضمن فريق متعدد المهام وبمفرده. | c3 |
| d1 | Communicate clearly and ethically, geological knowledge in both oral presentations and written reports | يوصل وبكفاءة المعارف العلمية المكتسبة بطريقة واضحة و ببعد أخلاقي شفويا وتحريريا. | d1 |
| d2 | Express knowledge about the structure, formation and evolution of the ocean basins | يظهر المعرفة لكيفية نشؤ و تطور البحار والتضاريس التي تميزها في الداخل. | d2 |

## Course Content محتوى المقرر

### Theoretical Aspect موضوعات الجانب النظري

| الرقم Order | الموضوعات الرئيسة/ الوحدات Topic List / Units | الموضوعات الفرعية Sub Topics List | عدد الأسابيع | الساعات الفعلية | رموز مخرجات |
|---|---|---|---|---|---|

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| | | | Number of Weeks | Contact Hours | التعلم للمقرر (CILOs) |
|---|---|---|---|---|---|
| 1 | Introduction and course overview | policies & procedures in marine geology | W1 | 2 | |
| 2 | History Of Marine Geology | pre-world war II exploration of the oceans<br>post-world war II exploration of the oceans | W2 | 2 | |
| 3 | Geomorphology of the Ocean Basins | plate tectonics, general concepts & controls,<br>structure & composition of oceanic basement, | W3 | 2 | |
| 4 | Ocean Basin Tectonics | principal features of ocean spreading centers, subduction zones, ophiolite complexes | W4 | 2 | |
| 5 | Structure and evolution | passive continental margins, active continental margins, type of modern beaches, coastal processes | W5 | 2 | |
| 6 | Ocean Circulation | waves and currents, coastal geomorphic features | W6 | 2 | |
| 7 | Mid-Term Exam | Previous lectures | W7 | 2 | |
| 8 | Physical Oceanography | temperature, salinity and density of seawater; oceanic heat budget, mixing processes in the oceans | W8 | 2 | |
| 9 | Chemical Oceanography | Elemental composition of seawater. Conservative and non-conservative behavior, the concept of salinity | W9 | 2 | |
| 10 | Coastal Processes and Landforms | Erosional Landforms<br>Depositional Landforms | W10 | 2 | |
| 11 | Ocean Sediments | Sediment types, global distribution of sediments, submarine fans | W11 | 2 | |
| 12 | Marine Sedimentation | technique used in sediment retrieval | W12 | 2 | |
| 13 | Marine Resources | Continental Margin Mineral Resources: Petroleum and Natural Gas<br>Deep Sea Minning: Metalliferous Oxides (Ferromanganese nodules) | W13 | 2 | |
| 14 | Introduction to Marine Acoustic Methods | Bathymetric Systems (echo-sounder), sonar-sources, Sub- | W14 | 2 | |

| | | | | | |
|---|---|---|---|---|---|
| | | bottom profiling, side-scan sonar, CDP, migration. | | | |
| **15** | Sea Level Changes | Eustatic Sea Level Changes<br>Isostatic Sea Level Changes<br>Global Warming and Present Sea level Changes | W15 | 2 | |
| **16** | Final Exam | inclusive | W16 | 2 | |
| **عدد الأسابيع والساعات الفعلية<br>Number of Weeks /and Contact Hours Per Semester** | | | 16 | 32 | |

**Practical Aspect (if any) الموضوعات العملية (إن وجدت)**

| الرقم<br>**Order** | التجارب العملية/ التمارين / تدريبات<br>**Practical / Exercises/ Tutorials topics** | عدد الأسابيع<br>**Number of Weeks** | الساعات الفعلية<br>**Contact Hours** | رموز مخرجات التعلم<br>**Course ILOs** |
|---|---|---|---|---|
| **1** | Art of Navigation: To understand the coordinate system, ship course-plotting on marine charts by using the compass-rose.<br>To explain the terms of bearing and heading. Unit conversions: marine velocites, depths and Distances like knots, Nautical mile, fathom .. etc. | W1 | 2 | |
| **2** | Sea Floor Spreading and Plate Tectonics: To illustrate the distribution of the ocean floor major physiographic features and its relationship with sea floor spreading & plate tectonics theories such as volcanoes, hotspots, oceanic trenches and mid oceanic ridges ..etc. | W2 | 2 | |
| **3** | Morphology & Geography of the Marine Environments: To ensure that the student be familiar with ocean topography and can draw a cross-section using a bathymetric map. | W3 | 2 | |
| **4** | Morphodynamics: major emphases on hydrodynamic effects on coasts. | W4 | 2 | |
| **5** | Marine Earthquakes Magnitude: students are introduced to the earthquake causes and their relation to plate tectonics. Calculate the magnitude of an earthquakes. Locating marine earthquake epicenter | W5 | 2 | |
| **6** | Tsunami Waves Records Analysis & Its Warning System (TWS) Mechanism | W6 | 2 | |
| **7** | Mid-Term Exam | W7 | 2 | |

| | | | | |
|---|---|---|---|---|
| 8 | Physical Oceanography: Geographical Distribution of Surface Temperature and Salinity ( Thermocline, Halocline, Pycnocline) | W8 | 2 | |
| 9 | Chemical Oceanography: lateral and vertical distributions of dissolved elements in the sea. | W9 | 2 | |
| 11 | Grain size analysis: Sieve analysis, Pipette, Burette analysis | W10,W11 | 4 | |
| | Seismic data acquisition and prcessing: seismic record (Ecogram), migration | W12 | 2 | |
| 12 | Sea-level Reconstruction: coastal terraces, uplift, and sea level changes | W13 | 2 | |
| 13 | Final Exam | W14 | 2 | |
| اجمالي الأسابيع والساعات الفعلية<br>**Number of Weeks /and Contact Hours Per Semester** | | **14** | **28** | |

## Teaching Strategies استراتيجيات التعليم والتعلم

- المحاضرة والعروض الايضاحية
- المناقشة والحوار
- العصف الذهني
- المهام والتكاليف والانشطة والتطبيقات العملية
- التعلم الذاتي والتعاوني (الانشطة والتكاليف المنزلية الفردية والجماعية والمشاريع التطبيقية)
- التغذية الراجعة

## Tasks and Assignments الأنشطة والتكليفات

| م<br>No | التكليف/ الواجب<br>Assignments | نوع التكليف<br>(فردي/ تعاوني) | الدرجة المستحقة<br>Mark | أسبوع التنفيذ<br>Week Due |
|---|---|---|---|---|
| 1 | **Discussion-Participation** | individual | 5 | **throughout** |
| 2 | **Assignments (topic research)** | Both | 5 | **W5, W11** |
| | **Total Score إجمالي الدرجة** | | **10/150** | |

## Learning Assessment تقويم التعلم

| م<br>No | أساليب التقويم<br>Assessment Method | موعد(أسبوع) التقويم<br>Week Due | الدرجة<br>Mark | الوزن النسبي%<br>Proportion of Final Assessment |
|---|---|---|---|---|

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| | | | | |
|---|---|---|---|---|
| 1 | الأنشطة و التكليفات<br>Tasks and Assignments | varies | 10 | 6.66 % |
| 2 | Quizzes | W6, W12 | 5 | 3.33 % |
| 3 | اختبار نصف الفصل ( عملي)<br>Midterm Exam (practical) | W7 | (15) | 10 % |
| 4 | Midterm Exam (theoretical)<br>اختبار نصف الفصل ( نظري) | W7 | 15 | 10% |
| 5 | lab activity and participation | throughout | (5) | 3.33 % |
| 6 | اختبار نهاية الفصل (عملي)<br>Final Exam (practical) | W 14 | (30) | 20% |
| 7 | اختبار نهاية الفصل (نظري)<br>Final Exam (theoretical) | W16 | 70 | 46.66% |
| Total المجموع | | | 150 | 150 % |

## Learning Resources مصادر التعلم

توثق المراجع حسب نظام APA (اسم المؤلف، سنة النشر، اسم الكتاب، دار النشر، بلد النشر).

**Required Textbook(s) (لا تزيد عن مرجعين) المراجع الرئيسة**

1. Seibold, E. and Berger, W. (2017) The Sea Floor, An Introduction to Marine Geology, Springer, 4th edition

Erickson, J. (2009) Marine Geology, Exploring the New Frontiers of the Ocean (The Living Earth), Revised Edition, 317p.

**Essential References المراجع المساندة**

*1.* Kennett (1982) Marine Geology, Prentice-Hall Inc., Englewood Cliffs, NJ 813p.

*1.Understanding Earth* by Frank Press and Ray Siever (ISBN 0716731339)

*2. The Ocean Basins: Their Structure and Evolution* published by the Open University (ISBN 0750639830)

3. Morelock, J., and Ramirrez, W. Marine Geology, A digital textbook in PDF format.

**Electronic Materials and Web Sites *etc.* المصادر الإلكترونية ومواقع الإنترنت**

http://geology.uprm.edu/MorelockSite/morelockonline/webresource.htm

## Course Policies الضوابط والسياسات المتبعة في المقرر

| | |
|---|---|
| 1 | **Class Attendance** حضور الفعاليات التعليمية<br>- Attendance is compulsory at all scheduled lectures and practical sessions. A student should attend not less than 75 % of total hours of the subject; otherwise he/she will not be able to take the exam and will be considered as exam failure and will be required to retake the course again. |
| 2 | **Tardy** الحضور المتأخر<br>- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class, he/she will be considered as absent. |
| 3 | **Exam Attendance/Punctuality** ضوابط الامتحان |

| | |
|---|---|
| | - The student should attend the exam on time. He/she is allowed to attend the exam within half an hour from the beginning of the exam, after that if late he/she will not be permitted to take the exam and will be considered as absent. |
| 4 | **Assignments & Projects** التعيينات والمشاريع<br>- Student has to submit all the assignments/reports for checking on time, mostly one week after given the assignment. |
| 5 | **Cheating** الغش<br>- Any student caught cheating will be expelled from the exam hall, and referred to a disciplinary council to apply the penalties as stipulated in the Student Affairs Regulations (SAR). Usually student will be assigned a course grade of F (Fail), more actions will be applied subject to the case in agreement with the SAR. |
| 6 | **Plagiarism** الانتحال<br>- Plagiarism means if you copy the work of another person and turn it in as your own, so plagiarism is one of the worst academic sins.<br>- Academic integrity, with its embodied values, is seen as a foundation of Sana'a University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to provide students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. Such behavior will lead to severe punishment liable to faculty/department evaluation. |
| 7 | **Other policies** سياسات أخرى<br>- During class lectures, please make sure that all cell phones must be off or on silent and put away in your pocket, or backpack or purse. They should not be visible during class. Audio and/or visual recording devices including, but not limited to, computers, personal digital assistants (PDA's), iPods, tape recorders, and cameras are not permitted to be on-they should be turned off and put away in your pocket, backpack or purse. Failure to comply with these policies will result in exclusion from the class.<br>- Students are not allowed to carry a cell phone or any relevant material into the exam hall, otherwise any such act will be treated as a cheating case, and disciplinary action will be taken according to University rules as above. |