استمارة وصف البرنامج الأكاديمي للكليات والمعاهد
للعام الدراسي 2020-2021

الجامعة : جامعة الموصل

الكلية /المعهد : الهندسة

القسم العلمي : السدود والموارد المائية

وصف البرنامج الأكاديمي

يوفر وصف البرنامج الأكاديمي هذا ايجازاً مقتضياً لأهم خصائص البرنامج ومخرجات التعلم المتوقعة من الطالب تحقيقها مبرهناً عما إذا كان قد حقق الاستفادة القصوى من الفرص المتاحة . ويصاحبه وصف لكل مقرر ضمن البرنامج

1. المؤسسة التعليمية	**جامعة الموصل**
2. القسم العلمي / المركز	كلية الهندسة / هندسة السدود والموارد المائية
3. اسم البرنامج الأكاديمي او المهني	هندسة السدود والموارد المائية
4. اسم الشهادة النهائية	بكالوريوس علوم
5. النظام الدراسي : سنوي /مقررات/اخرى	مقررات / سنوي
6. برنامج الاعتماد المعتمد	لايوجد
7. المؤثرات الخارجية الأخرى	القرارات العليا
8. تاريخ إعداد الوصف	
9. أهداف البرنامج الأكاديمي	
• تعزيز قابلية الطالب ومهاراته في التواصل التقني مثل مهارات العرض وكتابة التقارير والشرح كعضو ضمن فريق او بشكل منفرد.	

- ارشاد الطالب خلال مرحلة الدراسة للقيام بالدور الفعال مع زملائه بما يضمن روح التعاون والعمل الجماعي.
- خلق شخصية هندسية للخريج بإمكانها استيعاب المشاكل الهندسية والتعامل معها بحكمة وعلمية تتطلق من المخزون العلمي له بالإضافة لتهيئته لاخذ الدور القيادي على المستوى العلمي والإداري والمساهمة في تطوير المجتمع.
- استمرارية قنوات اتصال مع الخريجين من خلال المؤتمرات والندوات العلمية والفعاليات الاجتماعية الدورية ودورات التعليم المستمر.
- خدمة المجتمع من قبل التدريسين من حملة الشهادات العليا ومن خلال خدمات المكتب الاستشاري للكلية.
- تطوير الكادر التدريسي من خلال البعثات والدورات الدراسية والتفرغ العلمي ومن خلال ربط القسم مع الأقسام المكافئة في الجامعات العالمية المتطورة.
- تهيئة الخريجين لخدمة المجتمع بفعالية وكفاءة.
- المراجعة المستمرة للمناهج الدراسية بغية تطويرها وصولا الى المستوى العلمي المواكب للتقدم العلمي وحاجة المجتمع.
- ترسيخ المهارات والعلوم المعاصرة من علوم السدود والموارد المائية والتطبيقات الهندسية وغيرها من العلوم المساعدة الحديثة الضرورية لتامين قابلية الطالب على التطور والتعلم مدى الحياة.
- تطوير التعليم الهندسي البحثي للوصول الى مستوى مرموق بما يحقق متطلبات الجودة
- تطوير المختبرات العلمية بما يضمن سير العملية التعليمية والبحثية وإعطاء الخبرة المهنية في التطبيقات الهندسية
- إرساء خلفية معرفية تستند على علوم الهندسة السدود والموارد المائية
- التأكيد على بناء معرفة الطالب على أسس متينة من العلوم الأساسية كالرياضيات والفيزياء والعلوم الهندسية الأخرى المتعلقة باختصاص هندسة السدود والموارد المائية

10. مخرجات البرنامج المطلوبة وطرائق التعليم والتعلم والتقييم

أ- الاهداف المعرفية :

- مبادئ العلوم الأساسية والتطبيقية والهندسية اللازمة للالمام بأختصاص هندسة االسدود والموارد المائية (كالرياضيات والفيزياء والمكيانيك الهندسي والتربة والموائع...اللخ).
- أسس المهنية ومايتعلق بها من مهارات الاتصال مثل التقديم وكتابة التقارير مع الالمام بالمحددات الاقتصادية والقانونية والصحية والاجتماعية والأمنية-

ب -الاهداف المهاراتية الخاصة بالبرنامج :

- حل وصياغة المسائل الهندسية بشكل عام ولاسيما تلك المتعلقة بهندسة والموارد المائية.
- تحديد وصياغة المسائل الهندسية وتطبيق المعارف الرياضية والعلوم والطرق الهندسية ومهارات الابداع لحل المسائل في مجال السدود والموارد المائية.
- تفسير البيانات العددية وتطبيق الطرائق الرياضية على تحليل المسائل.
- تحضير المواصفات الفنية والتشغيلية لعناصر وأنظمة الطاقة والأجهزة الكهربائية

طرائق التعليم والتعلم: تتضمن طريقة التعليم والتعلم الأساليب التالية:

- المحاضرات النظرية
- جلسات المناقشة
- التجارب المختبرية
- مختبرات الحاسوب
- زيارات حقلية

طرائق التقييم:

- الامتحانات النصف فصلية والنهائية.
- الامتحانات القصيرة.
- التقارير
- الامتحانات العملية
- الالقاء

ج-مهارات التفكير:

- اجراء وتصميم التجارب العملية لمختبرات المباني والتربة والهيدروليك إضافة الى تحليل وتفسير النتائج العملية المتعلقة بنظم الموارد المائية.
- كتابة برامج حاسوبية واستخدام برامج جاهزة لحل المسائل المتعلقة بمجال الاختصاص.
- تطبيق التقنيات والمهارات والأدوات الهندسية الحديثة والسيطرة الذكية على على أنظمة وإدارة الموارد المائية

طرائق التعليم والتعلم

- المحاضرات النظرية
- جلسات المناقشة
- التجارب المختبرية
- مختبرات الحاسوب
- المشاريع
- التدريب

طرائق التقييم

- الامتحانات الفصلية والنهائية
- الامتحانات القصيرة
- التقارير
- الامتحانات العملية

د -المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي):

- العمل بأحترافية وبمسؤولية أخلاقية بشكل منفرد او ضمن فريق متعدد الاختصاصات.
- كتابة التقارير الفنية والالقاء بشكل فعال.
- استخدام تكنلوجيا المعلومات بشكل فعال المتعلقة بالتطبيقات الهندسية عموما ومجال السدود والموارد المائية بشكل خاص.
- إمكانية البدء بمشاريع بحثية علمية مستقبلا

طرائق التعليم والتعلم

- المحاضرات النظرية
- جلسات المناقشة
- التجارب المختبرية
- مختبرات الحاسوب
- المشاريع
- التدريب

طرائق التقييم

- الامتحانات الفصلية والنهائية
- الامتحانات القصيرة
- التقارير
- الامتحانات العملية

11.التخطيط للتطور الشخصي

تطور الطالب , برنامج المدرس لتطوير الطالب مثل استخدام الانترنت,استخدام(IT) , استخدام وسائل السلامة في المختبر وتنمية الشخصية الاكاديمية لدى الطالب القادرة على المنافسة والحوار وحل المشكلات.

12.معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)

1. التوزيع المركزي من قبل وزارة التعليم العالي يحدد المقبولين في كلية الهندسة.
2. تحدد اختيارات المقبولين في الأقسام حيث تتم المنافسة بينهم على أساس المجموع- ثم مجموع دروس المفاضلة.
3. يقبل النقل من الأقسام والجامعات الأخرى بموجب الضوابط والتعليمات العليا

13.أهم مصادر المعلومات عن البرنامج:

- تطوير البرنامج من خلال المصادر
- التوجيهات العليا
- ما يستحدث من علوم في مجال الاختصاص

رؤية القسم والرسالة والاهداف:

https://uomosul.edu.iq/engineering/%d8%a7%d9%84%d8%b1%d8%a4%d9%8a%d8%a9-%d9%88%d8%a7%d9%84%d8%b1%d8%b3%d8%a7%d9%84%d8%a9-/%d9%88%d8%a7%d9%84%d8%a7%d9%87%d8%af%d8%a7%d9%81-7

مخطط مهارات المنهج																							
يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم																							
				مخرجات التعلم المطلوبة من البرنامج																			
السنة / المستوى	رمز المقرر	اسم المقرر	أساسي أم اختياري	الاهداف المعرفية						الاهداف المهاراتية الخاصة بالبرنامج				الاهداف الوجدانية والقيمية				المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي)							
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4	د1	د2	د3	د4				
المستوى الأول / الفصل الاول	UOMC100	اللغة العربية	اجباري	√	√		√	√		√	√	√		√	√								
	UOMC102	الحاسوب	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	UOMC103	حقوق وحريات	اجباري	√		√	√	√	√	√	√	√	√	√	√								
	ENGC121	الرياضيات I	اجباري	√	√	√		√	√	√	√					√	√	√	√				
	ENGC123	الرسم الهندسي	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	ENGE 131	الهندسة الكهربائية	اختياري	√	√	√	√	√		√	√					√	√	√	√				
	ENGE 134	الكيمياء	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 140	مقدمة في هندسة الموارد المائية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 141	الجيولوجيا الهندسية	اجباري	√	√	√	√	√	√		√					√	√		√				
	DWR 142	الميكانيك الهندسي (ساكن)	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
المستوى الأول / الفصل الثاني	UOMC101	اللغة الانكليزية	اجباري	√	√	√	√	√	√	√	√					√		√	√				
	-	عمليات التصنيع	اختياري	√	√	√	√	√	√	√	√					√	√	√					
	-	تلوث البيئة	اختياري	√	√	√	√	√	√	√	√					√	√	√					
	-	تقنيات المعلومات	اختياري	√	√	√	√		√	√	√					√		√	√				
	-	تأسيسات كهربائية	اختياري	√	√	√		√	√	√	√					√	√	√	√				
	ENGC122	الرياضيات II	اجباري	√	√	√	√	√	√	√	√					√	√	√					
	ENGC124	الرسم بواسطة الحاسوب	اجباري	√	√		√	√	√	√	√					√	√	√	√				
	ENGE 133	الفيزياء	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 143	نوعية المياه والتلوث	اجباري	√	√	√	√	√	√		√						√		√				
	DWR 144	الميكانيك الهندسي (حركي)	اجباري	√	√	√	√	√		√	√						√	√	√				
	DWR 190	الوصفية	اختياري	√	√		√	√	√		√					√	√		√				

المقررات الدراسية لقسم هندسة السدود والموارد المائية / كلية الهندسة / جامعة الموصل

المستوى الاول

المستوى الدراسي الاول (الفصل الاول)									
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات الجامعة	اجباري	اللغة العربية	Arabic Language	2	-	2	-	UOMC100	
	اجباري	الحاسوب	Computer	2	2	3	-	UOMC102	
	اجباري	حقوق وحريات	Rights and Freedoms	2	-	2	-	UOMC103	
متطلبات الكلية	اجباري	الرياضيات I	Calculus I	3	-	3	-	ENGC121	
	اجباري	الرسم الهندسي	Engineering Drawing	-	3	1	-	ENGC123	
	اختياري	الهندسة الكهربائية	Electrical Engineering	2	-	2	-	ENGE 131	اجباري لطلبة القسم
	اختياري	الكيمياء	Chemistry	2	-	2	-	ENGE 134	
متطلبات القسم	اجباري	مقدمة في هندسة الموارد المائية	Introduction to Water Resources Engineering	2	-	2	-	DWR 140	
	اجباري	الجيولوجيا الهندسية	Engineering Geology	2	-	2	-	DWR 141	
	اجباري	الميكانيك الهندسي (ساكن)	Engineering Mechanics (Static)	2	-	2	-	DWR 142	
	مجموع ساعات ووحدات الفصل الدراسي الأول			19	5	21			

المستوى الدراسي الاول (الفصل الثاني)									
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات الجامعة	اجباري	اللغة الانكليزية	English Language	3	-	3	-	UOMC101	
	اختياري	عمليات التصنيع	Manufacturing Processes	2	-	2	-	-	يختار الطالب مقررين فقط ، عدد الوحدات المطلوبة = 4 وحدة
	اختياري	تلوث البيئة	Environmental Pollution	2	-	2	-	-	
	اختياري	تقنيات المعلومات	Information Technology	2	-	2	-	-	
	اختياري	تأسيسات كهربائية	Electrical Installations	2	-	2	-	-	
متطلبات الكلية	اجباري	الرياضيات II	Calculus II	3	-	3	الرياضيات I	ENGC122	
	اجباري	الرسم بواسطة الحاسوب	Auto-CAD	-	3	1	الرسم الهندسي	ENGC124	
	اختياري	الفيزياء	Physics	2	-	2		ENGE 133	اجباري لطلبة القسم
متطلبات القسم	اجباري	نوعية المياه والتلوث	Water Quality and Pollution	1	2	2		DWR 143	
	اجباري	الميكانيك الهندسي (حركي)	Engineering Mechanics (Dynamic)	2	-	2	Engineering Mechanics (Static)	DWR 144	
	اختياري	الوصفية	Descriptive Geometry	-	2	1		DWR 190	اجباري لطلبة القسم
	مجموع ساعات ووحدات الفصل الدراسي الثاني			13	7	18			

1-المؤسسة التعليمية	كلية الهندسة/ جامعة الموصل
2-القسم الجامعي/ المركز	قسم هندسة السدود والموارد المائية
3-اسم البرنامج الاكاديمي	Calculus-I Calculus-II
4- اسم الشهادة النهائية	بكالوريوس هندسة السدود والموارد المائية
5-النظام الدراسي	مقررات
6- برنامج الاعتماد المعتمد	التعليم الهندسي/ الاعتماد الهندسي Iraqi council accreditation for engineering education
7- المؤثرات الخارجية الاخرى	لاينطبق

8- اهداف البرنامج الاكاديمي

تزويد الطلبة بالمعلومات عن المفاهيم الأساسية في الرياضيات فالمادة تعتبر أساسية وتساهم بشكل كبير في تشكيل عقلية الطالب لتقبل بقية المواد الهندسية وهي من المواد التي لاغنى لطلبة الهندسة عنها

9. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم

المعرفة والفهم وجعل الكلبة قادرين على ان:

- يعرفوا مفهوم الرياضيات بشكل واضح
- يعرفوا كيفية استخدام العلاقات الرياضيةفي حل مسائل التطبيقية
- تحليل المسائل الرياضية بشكل منطقي

المهارات الخاصة بالموضوع:

- تحليل الطلبة للنتائج الرياضية
- اختيار الطرق العلمية المناسبة
- يكتسب الطالب مهارة تطبيق قوانين الرياضيات

طرائق التعليم والتعلم

المحاضرة والمناقشة وتشمل حل المسائل الرياضية التعلم التعاوني، المحاضرةوالعروض العملية بالإضافة الى الدروس العملية وحل التمارين والمناقشات في المجموعات الصغيرة

طرائق التقييم

الاختبارات التحريرية ، الفصلية، الأسبوعية، المشاركات ، الواجبات المطلوبة

مهارات التفكير

- تنمية مهارات التفكير المنطقي والقدرة على الاستنتاجات ذات المعنى
- تنمية مهارات التفكير العلمي والمنهجي
- تنمية مهارات اتخاذ القرارات

امتلاك المتقدم شهادة الدراسة الإعدادية بفرعها العلمي او شهادة المعهد التقني (الأوائل)

اجتيازه المنافسة عبر نظام التقديم بالاستمارة الالكترونية

11- اهم مصادر المعلومات عن البرنامج

الكتاب المنهجي: Calculus, by Finney and Thomas

University of Mosul		**Course Title:** Calculus-I
College of Engineering		**Course Number/Type:** ENGC121
Department: **Dams and water resources** Eng.		**Credit Hours**: 3 (3 hours/week) **Level/Term:** 1st level / Autum

Course Description:

To develop an understanding of the basic mathematics and its applications. Students will extend their experience with functions as they study the fundamental concepts and fundamental theorem of Calculus: limiting behaviors, the derivative and its applications, , Matries. Students review and extend their knowledge of trigonometry and basic analytic geometry. Important objectives of the calculus sequence are to develop and strengthen the 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 the tools of calculus to a variety of problem situations.

References:

1- Strang, G., & Herman, E. J. (2016). OpenStax Calculus (v. 1).

2- Gelfand, I. M., & Silverman, R. A. (2000). Calculus of variations. Courier Corporation.3- Apostol, T. M. (1991). Calculus, Volume 1. John Wiley & Sons.

4- Thomas, G. B., & Finney, R. L. (1961). Calculus. Addison-Wesley Publishing Company.

5- Hass, J. (2018). Thomas' calculus. Pearson.

Course Details:

Subject	Week
Pre-requisite for calculus	1
Pre-requisite for calculus	2
Limits and Continuity	3
Limits and Continuity	4
Derivatives	5
Derivatives	6
Derivatives	7
Applications of Derivatives	8
Applications of Derivatives	9
Applications of Derivatives	10
Applications of Derivatives	11
Matrices	12
Matrices	13
Review	14
Final Exam	15

University of Mosul		**Course Title:** Calculus-II
College of Engineering		Course Number/Type: ENGC121
Department: **Dams and water resources** Eng.		**Credit Hours**: 3 (1 lecture and 2 laboratory hours/week) **Level/Term:** 1st level / Spring **Prerequisites:** ENGC121 Calculus I

Course Description:

The objective of the course is to introduce students to the main topics of Integration, Applications of Definite Integrals, The Calculus of Transcendental Function, Techniques of Integration and Polar Coordinates**.**

References:

1- Calculus by Thomas and Finney

Course Details:

Subject	**Week**
Calculus and Area Formulas for finite sums	1
Definite integrals The fundamental theorems of integral calculus Indefinite integrals Integration by substitution-running the chain rule backword	2
Areas between Curves	3
Volumes of solids of revolution- Disks and Washers	4
Cylindrical shells – An alternative to washers	5
Lengths of curves in the plane Area of surfaces of revolution	6
Inverse Function s and their derivatives Natural logarithm, exponential function Logarithmic differentiation	7
Other Exponential and logarithmic functions Indeterminate forms and l'Hopital'	8
The inverse trigonometric functions Derivatives of inverse trigonometric functions related integral	9

1-المؤسسة التعليمية	كلية الهندسة/ جامعة الموصل
2-القسم الجامعي/ المركز	قسم هندسة السدود والموارد المائية
3-اسم البرنامج الاكاديمي	Engineering Mechanics – Statics Engineering Mechanics – Dynamics
4- اسم الشهادة النهائية	بكالوريوس هندسة السدود والموارد المائية
5-النظام الدراسي	مقررات
6- برنامج الاعتماد المعتمد	التعليم الهندسي/ الاعتماد الهندسي Iraqi council accreditation for engineering education
7- المؤثرات الخارجية الاخرى	Data Show

8- اهداف البرنامج الاكاديمي

الميكانيك الهندسي (السكون): ويتم فيه تعريف الطالب
1- بتأثيرات القوى على الأجسام.
2- بأنواع المنشآت الهندسية وكيفية تحليل هذه المنشآت.
3- كما يتم تعليم الطالب على كيفية حساب بعض الخصائص الهندسية للمنشآت كحساب مراكز الأشكال وحساب عزم القصور الذاتي.
الميكانيك الهندسي(الحركة): ويركز على دراسة القوى المؤثرة على الأجسام والحركة الناتجة عن تأثيرات هذه القوى

9. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم

أ-المعرفة والفهم
أ1- تعريف الطلبة بالقوى المؤثرة على المنشآت وأشكالها وكيفية تحليلها
أ2-تعريف الطلبة بأشكال وأنواع المنشآت الهندسية وكيفية تحليلها ليتعلموا بعد ذلك في المراحل القادمة من نتائج تحليلهم في تصميم هذه المنشآت الهندسية .
أ3- تمكين الطلبة من دمج الرياضيات مع الميكانيك الهندسي.

ب -المهارات الخاصة بالموضوع
ب 1 -تحديد نوع القوى وإشكالها.
ب 2 – كما يكتسب الطالب مهارة تحليل المنشآت
ب 3 - حساب بعض الخصائص الهندسية للمنشآت.

طرائق التعليم والتعلم

المحاضرات النظرية
محاضرات المناقشة
طلب تقارير من الطلبة عن بعض المواضيع لزيادة وعي الطلبة وربط الأمور العملية بالمفاهيم النظرية

طرائق التقييم

الاختبارات اليومية والفصلية والنهائية
المشاركات
الواجبات
الحضور

ج-مهارات التفكير
ج1- تنمية التفكير في البحث عن الطريقة الأفضل والأسهل في حل المسائل.
ج2- اكتساب مهارة في معرفة تشكل القوى المؤثرة على المنشآت من الناحية العملية.

ج3- كيفية ربط المعلومات التي تم أخذها في المرحلة الإعدادية مع ما يأخذه في دراسته الحالية،وتعريفه مدى أهمية المعلومات هذه في المراحل القادمة.
طرائق التعليم والتعلم
المحاضرات النظرية، الربط بين المعلومات النظرية والعملية،حل مسائل متنوعة في محاضرات المناقشة،طلب تقارير عن مواضيع خاصة بالمادة لتنمية المفاهيم عند الطلبة بشكل أكثر.
طرائق التقييم
الاختبارات اليومية والفصلية والنهائية المشاركات الواجبات الحضور
د -المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1-أصبح لدى الطالب مهارة في البحث عن المصادر الخارجية والخاصة بالمادة. د2-أصبح لدى الطالب الرغبة في تطوير نفسه من خلال البحث عن الأسئلة الخارجية. د3-يبدأ يدرك جيدا انه مهندس وكيف يوظف إمكانياته في تحقيق ذلك.
طرائق التعليم والتعلم
المحاضرات النظرية محاضرات المناقشة طلب تقارير من الطلبة عن بعض المواضيع لزيادة وعي الطلبة وربط الامور العملية بالمفاهيم النظرية
طرائق التقييم
الاختبارات اليومية والفصلية والنهائية المشاركات الواجبات الحضور
10. التخطيط للتطور الشخصي
11. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)
امتلاك المتقدم شهادة الدراسة الاعدادية بالفرع (العلمي) أو شهادة المعهد اجتيازه المنافسة عبر نظام التقديم بالاستمارة الالكترونية.
12. أهم مصادر المعلومات عن البرنامج
المصادر المنهجية: 1- الميكانيك الهندسي (علم السكون). تأليف:(د.نزار جبرائيل - فخري ياسين – د.هشام العذار) 2- الميكانيك الهندسي(علم الحركة). تأليف:(د.نزار جبرائيل - فخري ياسين – د.هشام العذار) 3- Engineering Mechanics(Statics). By: R.C. Hibbler 4- Engineering Mechanics(Dynamics). By: R.C. Hibbler 5- Engineering Mechanics(Statics). By: J.L. Meriam & L.G. Kraige 6- Engineering Mechanics(Dynamics). By: J.L. Meriam & L.G. Kraige 7- Vector Mechanics for Engineers (Statics& Dynamics).

University of Mosul		Course Title: Engineering Mechanics/statics
College of Engineering		Course Number/Type: DWR 142
Department: **Dams and water resources** Eng.		**Credit Hours**: 3 (1 lecture and 2 laboratory hours/week) **Level/Term:** 1st level / Spring **Prerequisites: ….**

Course Description:

It is a theoretical material that is considered an introduction to

-The strength of materials taken in the second stage.

-The principles of construction theory that are taken in the third stage.

-Designs of steel structures taken in the fourth stage.

Refernces:

1- Engineering Mechanics/ Statics/ R.C. HIBBELER

2- الميكانيك الهندسي علم السكون-الجزء الاول

اسم المؤلف: د.نزار جبرائيل الياس

د.هشام مصطفى العناز

فخري ياسين محمود

Course Details:

Subject	**Week**
Principles of statics	1
Forces systems and their resultant	2+3
Equilibrium	4+5+6
Trusses and frames- Structures Analysis	7+8
Friction	9
Center of gravity and centroid	10+11+12
Moment of Inertia	13+14+15

الفصل الثاني (علم الحركة)	
الوصف	عدد الأسابيع
مبادئ عامة -مقدمة عن علم الحركة -قوانين نيوتن -اشكال الحركة	1
وصف الحركة للجسيم -مقدمة عن علم الحركة -حركة الاجسام -الحركة الانتقالية المستقيمة -الازاحة، السرعة، التعجيل -حساب حركة الاجسام -الحركة المستقيمة المنتظمة -التعجيل المنتظم للحركة المستقيمة -الحركة المنحنية -الحركة الدائرية	5
القوى المؤثرة على الجسيمات -المقدمة -قانون نيوتن الثاني -الحركة الخطية -الاحتكاك الحركي -الحركة المنحنية -محصلة أي منظومة قوى	4
الشغل والطاقة -المقدمة -معادلات الأساسية للشغل والطاقة-الحركة المستقيمة -معادلة الشغل والطاقة للقوى الثابتة -تطبيقات طريقة الشغل والطاقة-قوى ثابتة	5

1-المؤسسة التعليمية	كلية الهندسة/ جامعة الموصل
2-القسم الجامعي/ المركز	قسم هندسة السدود والموارد المائية
3-اسم البرنامج الاكاديمي	Computerالحاسوب
4- اسم الشهادة النهائية	بكالوريوس هندسة السدود والموارد المائية
5-النظام الدراسي	مقررات
6- برنامج الاعتماد المعتمد	التعليم الهندسي/ الاعتماد الهندسي Iraqi council accreditation for engineering education
7- المؤثرات الخارجية الاخرى	Data Show
8- اهداف البرنامج الاكاديمي	
تزويد الطلبة بالمعلومات عن المفاهيم الأساسية في الحاسوب فالمادة تعتبر أساسية وتساهم بشكل كبير في تشكيل عقلية الطالب في برمجة المسائل الهندسية .	

9. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم
أ-المعرفة والفهم أ1- تعريف الطلبة بالأسلوب المنطقي المتسلسل لتصميم البرامج. أ2-تعليم الطالب كيفية تطبيق البرمجة لحل المسائل الهندسية مثل التحليل والتصميم .
ب -المهارات الخاصة بالموضوع ب 1-التعامل مع الحاسوب.
طرائق التعليم والتعلم
المحاضرات النظرية محاضرات المناقشة إعطاء واجبات للطلبة عن بعض المواضيع لزيادة وعي الطلبة وربط الأمور العملية بالمفاهيم النظرية
طرائق التقييم
الاختبارات اليومية والفصلية والنهائية المشاركات الواجبات الحضور
ج-مهارات التفكير ج1- تنمية التفكير في البحث عن الطريقة الأفضل والأسهل والأقصر في كتابة البرامج. ج2-اكتساب مهارة في كتابة البرامج للمسائل المتنوعة
طرائق التعليم والتعلم
المحاضرات النظرية، الربط بين المعلومات النظرية والعملية،حل مسائل متنوعة في محاضرات المناقشة.
طرائق التقييم
الاختبارات اليومية والفصلية والنهائية المشاركات الواجبات الحضور

د -المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1-أصبح لدى الطالب مهارة في البحث عن المصادر الخارجية والخاصة بالمادة. د2-أصبح لدى الطالب الرغبة في تطوير نفسه من خلال البحث عن الأسئلة الخارجية. د3-بدأ يدرك جيدا انه مهندس وكيف يوظف إمكانياته في تحقيق ذلك. د4-
طرائق التعليم والتعلم
المحاضرات النظرية محاضرات المناقشة طلب تقارير من الطلبة عن بعض المواضيع لزيادة وعي الطلبة وربط الأمور العملية بالمفاهيم النظرية
طرائق التقييم
الاختبارات اليومية والفصلية والنهائية المشاركات الواجبات الحضور
10. التخطيط للتطور الشخصي
11. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)
امتلاك المتقدم شهادة الدراسة الإعدادية بالفرع (العلمي) أو شهادة المعهد اجتيازه المنافسة عبر نظام التقديم بالاستمارة الالكترونية.

University of Mosul		Course Title: Computer
College of Engineering		Course Number/Type: UOMC 102
Department: **Dams and water resources** Eng.		**Credit Hours**: 3 (2 lecture and 2 laboratory hours/week) **Level/Term:** 1st level / Spring **Prerequisites: ….**

Course Description:

Computing Fundamentals and Office 2013 applications will be covered during this course.

Computing Fundamentals focuses on hardware and software and how they work together. The course includes activities and exercises that guide students to explore the Windows operating system, change settings, and customize the desktop. Students also learn how to manage files and folders. On the other hand, the Key Applications focuses on two of the Microsoft Office 2013 applications: Word and Excel. The course explains the purpose of commonly used software features and step-by-step demonstrations on how to use those features. Students will practice mastering those features to complete typical day-to-day tasks at home, school, and work.

Refernces:

1- 2015 Computer Literacy BASICS: A Comprehensive Guide to IC3

Connie Morrison, Dolores Wells, Lisa Ruffolo
Cengage Learning. ISBN: 128576658X

2- IC3 GS5 Certification Guide Using Windows 10 & Office 2016

Print ISBN: 978-1-55332-463-8

Course Details:

Subject	Week
a) Computer Fundamental	
1- Computers and Operating System	2
2- Software and Hardware Interaction	2
3- Windows File Management	1
4- Operating System Customization	1
5- Computer Hardware	2
(b) Key Applications	
1- Exploring Microsoft Office 2013	1
2- Getting Started with Word Essentials	1
3- Editing and Formatting Documents	2
4- Getting Started with Excel Essentials	1
5- Organizing and Enhancing Worksheets	1
6- Creating Formulas and Charting Data	1

University of Mosul
College of Engineering
Department of …….

Title

Academic Year:	**2020-2021**
Level:	**1st**
Semester:	**2nd Semester**
Course Code:	**ENGC 124**
Type of the Course:	**Core**
Credit:	
No. of Weekly Hours:	**Theoretical: 1 Hour Practical: 2 Hours**
Course Duration:	**15 weeks**
Prerequisite Courses:	**Engineering Drafting**

Description: The subject is about teaching students engineering drawings using AutoCAD. Teaching the subject includes both theoretical lectures and Lab. Tutorials.

Objectives: Qualifying students to use AutoCAD for engineering drawings efficiently in order to help them in their designs & projects.

Reference Book: Autodesk AutoCAD 2018 online Help.

Course Outcomes: After finishing the course, students will be able to use AutoCAD commands to make drawings, create annotations, create & insert symbols, dimension a drawing, create blocks, and plot drawings with certain scales.

Course weekly details

Week #	Outline
1	Getting started: 1- Start a new drawing. 2- User Interface. 3- Drafting settings I (Snap, Rectangular & Isometric grid). 4- Limits. 5- Units. 6- Absolute & Relative coordinate system. 7- Ortho.
2	Drawing I 1- 2- Line, Arc, Circle, Ellipse, Polygon, Rectangle,
3	Drawing II, View. 1- Zoom, Pan, 2- Drafting settings II.(Osnap, Polar snap). 3- Pline, Pedit. 4- Erase. 5- Selecting objects. 6- Ltype, Ltscale.
4	Modify I, Drawing III: 1-Copy, Rotate, Move, Scale, Stretch. 2- Undo, U, Redo. 3- , Lweight. 4- Divide, Measure.5- Point (DDPTYPE).
5	Layers, Modify II: 1- Working with Layers. 2- Properties (Mo, Ch). 4- Working with Grips.

6	Modify III. 1- Array, Offset, Fillet, Chamfer, Trim, Extend, Lengthen, Mirror, Break, Join, Explode.
7	Annotation I, Modify IV, Inquiry: 1-Style, Text, Mtext, Ddedit,. 2- ID, Dist, Area, Massprop
8	Annotation II: 1- Dimensions & Leaders.
9	Term Exam I
10	Hatch, Hatchedit..
11	Block I: 1- Block, Insert. 2- Wblock. 3- Image, Draworder.4-plot
12	
13	
14	Template Drawings.
15	Final Exam.

Grading Policy:

Theoretical part		Practical part	
2 Quizzes, (each 8 pts)	16 pts		
		4 H.W (each 1pt)	4 pts
1st term Exam	15 pts		
2nd term Exam	15 pts		
Final Exam	50 pts		
Total 100pt			

COURSE INSTRUCTOR

1-المؤسسة التعليمية	كلية الهندسة/ جامعة الموصل
2-القسم الجامعي/ المركز	قسم هندسة السدود والموارد المائية
3-اسم البرنامج الاكاديمي	Computerالحاسوب
4- اسم الشهادة النهائية	بكالوريوس هندسة السدود والموارد المائية
5-النظام الدراسي	مقررات
6- برنامج الاعتماد المعتمد	التعليم الهندسي/ الاعتماد الهندسي Iraqi council accreditation for engineering education
7- المؤثرات الخارجية الاخرى	Data Show

8. أهداف البرنامج الأكاديمي

تعريف الطلبة بأهمية الرسم الهندسي في مجال الهندسة المدنية والحياة العملية وتنمية قابلية الطلبة على كيفية رسم المخططات الهندسية المختلفة والأجسام ، وهي تبدأ بالتعرف على أدوات الرسم الهندسي وكيفية استخدامها في رسم اللوحات الهندسية والمتضمنة الإشكال الهندسية ومساقط الأجسام والمقاطع المختلفة الأنواع ، كما يتم تعليم الطلبة كيفية التعامل مع برامج الحاسوب الخاصة بالرسم الهندسي وكيفية رسم المخططات البسيطة باستخدام هذه البرامج .

9. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم

أ-المعرفة والفهم :جعل الطلبة قادرين على أن:
أ1- دراسة وفهم الخرائط الهندسية في مختلف مجالات الهندسة المدنية .
أ2- التعبير عن الأفكار والحلول الهندسية بما يتناسب ذلك مع المخططات التوضيحية .
أ3- فهم وتطبيق المقاطع الهندسية الضرورية لتكملة المخططات المختلفة .
أ4- تنفيذ الخرائط والمخططات للمشاريع الهندسية بشكل صحيح على أرض الواقع .
أ5- كشف أي خطأ أو نقص في المخططات للمشاريع الهندسية المختلفة .
أ6- التعامل مع الرسم باستخدام برنامج الأوتوكاد وأعداد الخرائط والتصاميم المختلفة للمشاريع .

ب -المهارات الخاصة بالموضوع
ب 1 – زيادة قابلية الطلبة على تخيل الأجسام الهندسية وطريقة رسمها .
ب 2 – التمييز بين الرسم اليدوي والرسم باستخدام الحاسوب والقدرة على التعامل معهما .
ب 3 – اكتساب السرعة والمقدرة الكبيرة في رسم المخططات الهندسية المختلفة .

طرائق التعليم والتعلم

شرح كامل للموضوع ثم الرسم اليدوي العملي والتطبيقي .
والرسم باستخدام الحاسوب والبرامج المناسبة .

طرائق التقييم

الاختبارات التحريرية الفصلية ، الاختبارات اليومية ، رسم لوحات بالمرسم (صفية) رسم لوحات وواجبات بيتية، النشاط الصفي ، الحضور المستمر وعدم الغياب .

ج-مهارات التفكير
ج1- تنمية مهارات التفكير والخيال والقدرة على الرسم الهندسي .
ج2- تنميه مهارات التفكير العلمي والمنهجي
ج3- تنمية مهارات اتخاذ القرارات في أعمال التنفيذ للمشاريع الهندسية .

ج4- تنمية التفكير المتباعد ومهارات التفكير البصري.
طرائق التعليم والتعلم
شرح المحاضرة لموضوع معين ،رسم المسائل ذات العلاقة بالموضوع في المرسم ، متابعة الطلبة أثناء الرسم اليدوي وتجنب الأخطاء الممكن حدوثها ، الإجابة على جميع أسئلة الطلبة أثناء عملية الرسم ، المناقشات في المجموعات الصغيرة من الطلبة أثناء الرسم .
طرائق التقييم
الاختبارات التحريرية الفصلية ، الاختبارات اليومية ، رسم لوحات بالمرسم (صفية) رسم لوحات وواجبات بيتية . النشاط الصفي ، الحضور المستمر وعدم الغياب .
د -المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي) د1- تعزيز مهارة الطالب في مواجهة حل بعض المشكلات الخاصة برسم اللوحات الهندسية. د2- تنمية تحمل المسؤولية أثناء رسم اللوحات الهندسية . د3- أداء الاختبارات في الموعد المحدد د4- أداء الواجبات المطلوبة منه في الموعد المحدد .
10. التخطيط للتطور الشخصي
11. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)
امتلاك المتقدم شهادة الدراسة الإعدادية بفرعها العلمي اجتيازه المنافسة عبر نظام التقديم بالاستمارة الالكترونية.
12. أهم مصادر المعلومات عن البرنامج
1- عبد الرسول عبد الحسين ، (1986) " الرسم الهندسي " ، الجامعة التكنولوجية 2- فتحي الشريف ، (1978) ، " الرسم الهندسي ، جامعة حلب

Level:	**1st**
Semester:	**2nd Semester**
Course Code:	**ENGC 124**
Type of the Course:	**Core**
Credit:	
No. of Weekly Hours:	**Theoretical: 1 Hour Practical: 2 Hours**
Course Duration:	**15 weeks**
Prerequisite Courses:	**Engineering Drafting**

Description: The subject is about teaching students engineering drawings using AutoCAD. Teaching the subject includes both theoretical lectures and Lab. Tutorials.

Objectives: Qualifying students to use AutoCAD for engineering drawings efficiently in order to help them in their designs & projects.

Reference Book: Autodesk AutoCAD 2018 online Help.

Course Outcomes: After finishing the course, students will be able to use AutoCAD commands to make drawings, create annotations, create & insert symbols, dimension a drawing, create blocks, and plot drawings with certain scales.

Course weekly details

Week #	Outline
1	Getting started: 1- Start a new drawing. 2- User Interface. 3- Drafting settings I (Snap, Rectangular & Isometric grid). 4- Limits. 5- Units. 6- Absolute & Relative coordinate system. 7- Ortho.
2	Drawing I 1- 2- Line, Arc, Circle, Ellipse, Polygon, Rectangle,
3	Drawing II, View. 1- Zoom, Pan, 2- Drafting settings II.(Osnap, Polar snap). 3- Pline, Pedit. 4- Erase. 5- Selecting objects. 6- Ltype, Ltscale.
4	Modify I, Drawing III: 1-Copy, Rotate, Move, Scale, Stretch. 2- Undo, U, Redo. 3- , Lweight. 4- Divide, Measure.5- Point (DDPTYPE).
5	Layers, Modify II: 1- Working with Layers. 2- Properties (Mo, Ch). 4- Working with Grips.
6	Modify III. 1- Array, Offset, Fillet, Chamfer, Trim, Extend, Lengthen, Mirror, Break, Join, Explode.
7	Annotation I, Modify IV, Inquiry: 1-Style, Text, Mtext, Ddedit,. 2- ID, Dist, Area, Massprop
8	Annotation II: 1- Dimensions & Leaders.
9	Term Exam I
10	Hatch, Hatchedit..
11	Block I: 1- Block, Insert. 2- Wblock. 3- Image, Draworder.4-plot
12	
13	
14	Template Drawings.
15	Final Exam.

1-المؤسسة التعليمية	كلية الهندسة/ جامعة الموصل
2-القسم الجامعي/ المركز	قسم هندسة السدود والموارد المائية
3-اسم البرنامج الاكاديمي	الجيولوجيا الهندسية
4- اسم الشهادة النهائية	بكالوريوس هندسة السدود والموارد المائية
5-النظام الدراسي	مقررات
6- برنامج الاعتماد المعتمد	التعليم الهندسي/ الاعتماد الهندسي Iraqi council accreditation for engineering education
7- المؤثرات الخارجية الاخرى	لاينطبق

8. أهداف البرنامج الأكاديمي
تهدف المادة إلى إعطاء مقدمة وتفصيل عن الجيولوجيا الهندسية والأنواع المختلفة للصخور والمعادن وكذلك التصنيف الهندسي للصخور والتربة باعتبارهما الأساس الذي تقام عليه المنشآت الهندسية. دراسة بعض أنواع المنشآت الهندسية كالاتفاق والسدود ومن جانب آخر الربط بين الجيولوجيا الهندسية ومناهج البحث في الهندسة المدنية واستخدامه في إعداد مشروع التخرج.
9. مخرجات التعلم المطلوبة وطرائق التعليم والتعلم والتقييم
أ-المعرفة والفهم جعل الطلبة قادرين على أن: أ1- يعرفوا مفهوم الجيولوجيا الهندسية. أ2- كيفية تبويب البيانات واستخدامها في رسم الخرائط الطبوغرافية والجيولوجية. أ5- كيفية اختيار الصخور او الأنواع المختلفة من الترب لإقامة المنشآت الهندسية. أ7- كيفية إتباع الخطوات الهندسية المتسلسلة في التعرف على الأنواع المختلفة للتربة والصخور. أ8- كيفية اختيار البديل الأفضل لتصميم أي مشروع يخص أعمال الجيولوجيا الهندسية وكذلك ميكانيك التربة بموجب المحددات الهندسية المعتمدة. أ9- كيفية إجراء التجارب العملية والمختبرية للصخور.
ب -المهارات الخاصة بالموضوع ب 1 – استخدام الطلبة للبيانات والمخططات في إعداد التصاميم. ب 2 - مقارنة النتائج والتصاميم مع متطلبات المواصفات القياسية المعتمدة. ب 3 - اعتماد التحليل الإحصائي في تحليل وتفسير النتائج الخاصة بالاختبارات القياسية. ب 4 – اختيار الاختبار الإحصائي المناسب للتحقق من صحة النتائج. ب 5 - يكتسب الطالب مهارة تطبيق القوانين والمخططات والمواصفات الخاصة بالجيولوجيا الهندسية .
طرائق التعليم والتعلم
المحاضرة، المناقشة، الواجبات، البرامجيات SOFTWARE ، التجارب العملية.
طرائق التقييم
الاختبارات التحريرية ، الاختبارات العملية. مشاركات، واجبات مطلوبة.
ج-مهارات التفكير ج1- تنمية مهارات التفكير المنطقي والقدرة على الاستنتاجات ذات المعنى. ج2- تنميه مهارات التفكير العلمي والمنهجي. ج3- تنمية مهارات اتخاذ القرارات.

ج4- تنمية التفكير المتباعد ومهارات التفكير البصري.
طرائق التعليم والتعلم
حل المشكلات ،حل المسائل الهندسية ، العصف الذهني، التعلم التعاوني، المحاضرة والعروض العملية بالإضافة إلى الدروس العملية وحل الأسئلة والتمارين والمناقشات في المجموعات الصغيرة.
طرائق التقييم
اختبارات عملية وختامية تحريرية، الواجبات، تطبيق البرامجيات.
د -المهارات العامة والمنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي). د1- تعزيز مهارة الطالب في مواجهة حل بعض المشكلات باستخدام الطرق الهندسية. د2- تنمية تحمل المسؤولية. د3- أداء الاختبارات في الموعد المحدد. د4- أداء الواجبات المطلوبة منه في الموعد المحدد.
طرائق التعليم والتعلم
حل المشكلات ،حل المسائل الهندسية ، العصف الذهني، التعلم التعاوني، المحاضرة والعروض العملية بالإضافة إلى الدروس العملية وحل الأسئلة والتمارين والمناقشات في المجموعات الصغيرة.
طرائق التقييم
اختبارات عملية وختامية تحريرية، الواجبات، تطبيق البرامجيات.
10. معيار القبول (وضع الأنظمة المتعلقة بالالتحاق بالكلية أو المعهد)
امتلاك المتقدم شهادة الدراسة الإعدادية بفرعها العلمي أو شهادة معهد فني. اجتيازه المنافسة عبر نظام التقديم بالاستمارة الالكترونية.
11. أهم مصادر المعلومات عن البرنامج
1. Attewell P B and Farmer I W. principles of engineering geology Chapman and Hall, London 2. Bell F G engineering geology and geotechnics Newnes- Butterworihs. London. 3. Blyth F G H and Freitas M H a geology for engineers (7th edition) Edward Arnold London .. 4 .Hunt C B geology of soils W H Freeman and Co. San Francisco 5. سنغ ب و ش براكاش ميكانيك التربة وهندسة الاسس ترجمة د. محمد عمر العشو جامعة الموصل. 6. كنانة محمد ثابت، رياض الدباغ. يوسف عمرو مبادئ الجيولوجيا الهندسية مطبعة جامعة الموصل.

يهدف جزء المعادن الى تعريف الطلبة بانواع المعدن وخصائصا خاصة الخصائص الهندسية إضافة الى المعادن الطينية ذات الأهمية الكبيرة في الهندسة المدنية

يهدف جزء الصخور الى تعريف الطلبة بانواع الصخور الثلاث (النارية والرسوبية والمتحولة) وفروع كل نوع إضافة الخصائص المختلفة لهذه الصخور والتعرف على كيفية تصنيف الأنواع المختلفة من الصخور وملائمة كل نوع من هذه الصخور لاقامة المشاريع الهندسية

يهدف جزء التعرية والتجوية وتكوين التربة الى تعريف الطلبة بعوامل التجوية والنحت وانواعها واثرها على تكوين التربة إضافة الى أنواع الترب

يهدف جزء التراكيب الجيولوجية الى تعريف الطلبة بانواع التراكيب الجيولوجية كالفوالق والفواصل والطيات والطبقات المائلة وغيرها من التراكيب الجيولوجية وتاثير هذه التركيب على المنشات الهندسية المقامة فوق وتحت سطح الأرض

يهدف جزء الخواص الهندسية للتربة الى تعريف الطلبة بخواص التربة الدليلية والفيزيائية والميكانيكية إضافة للخواص (الهيدروليكية وهذا الفصل يعتبر مدخل الى موضوع (ميكانيك التربة

يهدف جزء المياه الجزفية الى تعريف الطلبة بالمياه الجوفية وطريقة تواجدها داخل صخور القشرة الأرضية واستخدام هذه المياه

يهدف جزء الخرائط الطوبغرافية والجيولوجية الى تعريف الطلبة بالخرائط الطوبغرافية والطرق المتعددة المستخدمة في رسم هذه الخرائط، اضافة الى الطرق المتعددة في رسم الخرائط الجيولوجية.

References:

اسس الجيولوجيا للمهندسين- د.محمد عمر العشو

مبادئ ميكانيك التربة – د. محمد عمر العشو

Course Details:

Subject	Week
المقدمة	1
المعادن	2
الصخور	3
	4
التجوية والتعرية وتكوين التربة	5
التراكيب الجيولوجية	6
الخواص الهندسية للصخور	7
الخواص الهندسية للتربة	8
	9
	10
	11
المياه الجوفية	12
الخرائط الطوبغرافية والجيولوجية	13
	14
	15

المستوى الثاني

مخطط مهارات المنهج																					
يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم																					
				مخرجات التعلم المطلوبة من البرنامج																	
السنة / المستوى	رمز المقرر	اسم المقرر	أساسي أم اختياري	الاهداف المعرفية				الاهداف المهاراتية الخاصة بالبرنامج				الاهداف الوجدانية والقيمية				المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي)					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4	د1	د2	د3	د4		
المستوى الثاني / الفصل الاول	ENGC 227	الإحصاء	اجباري	√	√	√	√	√		√	√					√	√	√	√		
	DWR 240	الرياضيات III	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 241	ميكانيك الموائع I	اجباري	√	√	√	√	√		√	√					√		√	√		
	DWR 242	المساحة I	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 243	انشاء المباني	اجباري	√	√	√	√	√	√	√	√					√		√	√		
	DWR 244	مقاومة المواد I	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 245	فيزياء التربة	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 246	برمجة الحاسوب (ماتلاب)	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 290	مشاريع الموارد المائية في العراق	اختياري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 291	تطبيقات الاستشعار عن بعد ونظم المعلومات الجغرافية	اختياري	√	√	√		√	√	√	√					√	√	√	√		
المستوى الثاني / الفصل الثاني		اللغة الانكليزية - ما قبل المتوسط	اجباري	√	√		√	√	√	√	√					√	√		√		
	UOMC 041	اخلاقيات المهنة	اجباري	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		
	ENGE 229	السلامة العامة	اختياري	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√		
	DWR 247	الرياضيات IV	اجباري	√	√	√	√	√	√	√	√					√	√	√	√		
	DWR 248	ميكانيك الموائع II	اجباري	√	√		√		√	√	√					√	√	√	√		
	DWR 249	المساحة II	اجباري	√	√	√	√	√	√	√	√					√	√		√		
	DWR 250	تقنيات مواد الانشاء	اجباري	√		√	√	√	√	√	√					√		√	√		
	DWR 251	ادارة المياه واستصلاح الاراضي	اجباري	√	√	√	√		√	√	√						√	√	√		
	DWR 252	هيدروجيولوجي	اجباري		√	√		√	√	√	√						√	√	√		
	DWR 253	مقاومة المواد II	اجباري	√	√		√	√	√		√					√	√	√	√		

المقررات الدراسية لقسم هندسة السدود والموارد المائية / كلية الهندسة / جامعة الموصل

المستوى الثاني

المستوى الدراسي الثاني / الفصل الاول								
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات الكلية	اجباري	الإحصاء	Statistics	2	---	2		ENGC 227	
متطلبات القسم	اجباري	الرياضيات III	Calculus III	1	3	2	الرياضيات I	DWR 240	
	اجباري	ميكانيك الموائع I	Fluid Mechanics I	2	---	2		DWR 241	
	اجباري	المساحة I	Engineering Surveying I	1	3	2		DWR 242	
	اجباري	انشاء المباني	Building Construction	1	2	2		DWR 243	
	اجباري	مقاومة المواد I	Strength of Materials I	2	---	2	الميكانيك الهندسي (ساكن)	DWR 244	
	اجباري	فيزياء التربة	Soil Physics	1	2	2		DWR 245	
	اجباري	برمجة الحاسوب (ماتلاب)	Computer Programming (Matlab)	1	2	2		DWR 246	
	اختياري	مشاريع الموارد المائية في العراق	Water Resource Projects in Iraq	2	---	2		DWR 290	يختار الطالب مقرر واحد ، عدد الوحدات المطلوبة = 2 وحدة
	اختياري	تطبيقات الاستشعار عن بعد ونظم المعلومات الجغرافية	Remote Sensing and GIS applications	1	2	2		DWR 291	
مجموع ساعات ووحدات الفصل الدراسي الأول				14	14	18			

المستوى الدراسي الثاني / الفصل الثاني									
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات الجامعة	اجباري	اللغة الانكليزية - ما قبل المتوسط	English Language - Pre Intermediate	1	---	1			وحدتين لكل مستوى دراسي وقد تم استيفاء ثلاثة وحدات في المستوى الاول لذلك ستكون وحدة واحدة لهذه السنة فقط
	اجباري	اخلاقيات المهنة	Professional Ethics	2	---	2		UOMC 104	
متطلبات الكلية	اختياري	السلامة العامة	Public Safety	2	---	2		ENGE 229	اجبارية لطلبة القسم
متطلبات القسم	اجباري	الرياضيات IV	Calculus IV	1	3	2	الرياضيات III	DWR 247	
	اجباري	ميكانيك الموائع II	Fluid Mechanics II	2	3	3	ميكانيك الموائع I	DWR 248	
	اجباري	المساحة II	Engineering Surveying II	1	3	2	المساحة I	DWR 249	
	اجباري	تقنيات مواد الانشاء	Construction Material Technology	1	3	2	انشاء المباني	DWR 250	
	اجباري	ادارة المياه واستصلاح الاراضي	Water Management and Land Reclamation	1	2	2	فيزياء التربة	DWR 251	
	اجباري	هيدروجيولوجي	Hydrogeology	1	---	1	الجيولوجيا الهندسية	DWR 252	
	اجباري	مقاومة المواد II	Strength of Materials II	2	---	2	مقاومة المواد I	DWR 253	
مجموع ساعات ووحدات الفصل الدراسي الثاني				14	14	19			

Module Information
معلومات المادة الدراسية

Module Title	**Mathematics III**		**Module Delivery**
Module Type	**Basic learning activities**		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	1
Administering Department	Dams and Water Recourses	**College**	Engineering
Module Leader	Muhanad Talal Yousif	**e-mail**	Mohanad_ALsheer@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Dr. Anmar Altalib	**e-mail**	Anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Polar coordinates system and its applications. 2. To understand Vectors and Geometry of Space, Scalar Product, Cross Product 3. This course deals with the basic concept of Partial Differentiation. 4. To understand Double Integrals and its applications. 5. To perform Infinite Sequences and Series analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrimination between Polar coordinates system and cartesian coordinates system. 2. Learn how to calculate the area and curve length in Polar coordinates system. 3. Describe the vector components and the products between two vectors. 4. Identify Partial Differentiation and Second – Order Partial Differentiation. 5. Explanation the double integral. 6. Define the Infinite Sequences and Series.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Polar coordinates system, Graphing in polar coordinates system, Area in polar coordinates system, Curve length in polar coordinates system. [16 hrs] Vectors and Geometry of Space, Space coordinate and space vector, Scalar Product (Dot Product) and Applications (line equation in the plane), Cross Product (Vector Product) and Applications (the distance from appoint to a line in space) . [24 hrs] Partial Differentiation, Second – Order Partial Differentiation, The chain rule for partial derivatives. [24 hrs]

	Double Integrals and its applications, The methods of least squares, Infinite Sequences and Series. [24 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of exercises involving some problems that are interesting to the students in mathematics scope.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Polar coordinates system, Graphing in polar coordinates system
Week 2	Area in polar coordinates system, Curve length in polar coordinates system
Week 3	Vectors and Geometry of Space, Space coordinate and space vector
Week 4	Scalar Product (Dot Product) and Applications (line equation in the plane)
Week 5	Cross Product (Vector Product) and Applications (the distance from appoint to a line in space)
Week 6	Plane Equation in space, Angles between planes
Week 7	Partial Differentiation, exercises
Week 8	Second – Order Partial Differentiation, exercises
Week 9	The chain rule for partial derivatives
Week 10	Directional Derivatives in the plane
Week 11	Tangent plane and normal line of surface
Week 12	Extreme (Maxima and Minima) values and Saddle points.
Week 13	Double Integrals and its applications
Week 14	The methods of least squares
Week 15	Infinite Sequences and Series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.	Yes
Recommended Texts	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.	No
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Fluid Mechanics 1**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ahmed younis Mohammed	**e-mail**	a.altaee@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	students in the dams and water stageThe fluid mechanics is the basic subject for second-resources engineering department that from this subject student will learn and practice to fluid properties (units and dimensions, Density, Specific weight. Viscosity, Surface tension, Capillarity. Fluid static (pressure–density–height relationships). Absolute pressure and gage pressure, types of pressure gages. Force on submerged plane surfaces. Force on submerged curved surfaces. Applied problem about gates, dams ……etc. Stability of submerged and floating bodies. This achieved by theoretical lecturers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. learn and practice to fluid properties. 2. learn the fundamental of pressure, (atmosphere, absolute and gauge) pressure. 3. Determine pressure in static fluid on vertical inclined and curved gates. 4. Determine stability of floating bodies and center of pressure.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, Fluid properties – Units and Dimensions, Density, Specific weight, [15 hrs] Compressibility, Elasticity. Viscosity, Surface tension, Capillarity. [15 hrs]

	Fluid static (pressure–density–height relationships). [15 hrs] Absolute pressure and gage pressure,. types of pressure gages. [15 hrs] Force on submerged plane surfaces, Force on submerged curved surfaces, Applied problem about gates, dams ……etc. [15 hrs] Stability of submerged and floating bodies, [10 hrs] Application on Stability of submerged and floating bodies. [10 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Fluid properties – Units and Dimensions, Density, Specific weight,
Week 3	Compressibility, Elasticity. Viscosity, Surface tension, Capillarity
Week 4	Fluid static (pressure–density–height relationships).
Week 5	Fluid static (pressure–density–height relationships).
Week 6	Absolute pressure and gage pressure,. types of pressure gages
Week 7	Mid-term Exam
Week 8	Force on submerged plane surfaces.

Week 9	Force on submerged curved surfaces
Week 10	Applied problem about gates, dams ……etc.
Week 11	Applied problem about gates, dams ……etc.
Week 12	Stability of submerged and floating bodies.
Week 13	Applied problems on Stability of submerged and floating bodies
Week 14	Applied problems on Stability of submerged and floating bodies
Week 15	Applied problems on Stability of submerged and floating bodies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1:Center of Pressure of Immersed Surface
Week 2	Lab 2:Bernoulli's equation
Week 3	Lab 3:Forces due to Jet Impact on Plates
Week 4	Lab 4:Reynolds Number in Pipe
Week 5	Lab 5: Reynolds Number in Pipe
Week 6	Lab 6: Flow Through Orifices
Week 7	Lab 7: Flow Through Orifices

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

Module Information

معلومات المادة الدراسية				
Module Title	**Strength of Materials**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U		**Semester of Delivery**	1
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader	Samer Sami Majeed		**e-mail**	s.gasgous@uomosul.edu.iq
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	MSc
Module Tutor			**e-mail**	E-mail
Peer Reviewer Name			**e-mail**	E-mail

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Mechanics I	**Semester**	1
Co-requisites module	Engineering Mechanics II	**Semester**	2

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of all types of forces. 2. To understand the effect of forces on all types of materials. 3. This course deals with the basic concept of simple stresses, shearing stresses, bearing stresses, statically indeterminate members, Torsion. Thin walled cylinders 4. This is the basic subject for all forces and stresses. 5. To understand Hooke law. 6. Shear and moment in beams. 7. Stresses in beams. 8. Deflection in beams.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the effect of forces on all types of materials. 2. Insure that the structures used will be safe against the maximum internal effects that may be produced by any combination of loading. 3. Draw shear and moment diagrams. 4. Determine the stresses on beams. 5. Determine the deflection on beams. 6. Design the section of beams.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Forces and stresses. simple stresses, shearing stresses, bearing stresses [15 hrs] Shearing stresses, bearing stresses. [15 hrs] Statically indeterminate members. [10 hrs] Torsion and thin walled cylinders. [15 hrs] Revision problem classes [6 hrs] Part B – Forces on beams. Shear and moment in beams. [15 hrs] Stresses in beams. [7 hrs] Deformation in beams. [15 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction
Week 2	Simple stresses
Week 3	Shearing stresses
Week 4	bearing stresses
Week 5	Statically indeterminate members
Week 6	Torsion
Week 7	thin walled cylinders
Week 8	Hooke law
Week 9	Poisson ratio
Week 10	Shear and moment in beams
Week 11	Shear and moment in beams
Week 12	Stresses in beams
Week 13	Stresses in beams
Week 14	Deformation in beams
Week 15	Deformation in beams
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Strength of Materials, Andrew Pytel&Ferdinand L Singer, 1980.	Yes

Module Information

معلومات المادة الدراسية

Module Title	**Surveying I**	**Module Delivery**

Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U		**Semester of Delivery**	3
Administering Department	DWRE 214	**College**	Engineering	
Module Leader	Dr. Omar Muqdad Abdulgany	**e-mail**	O.agha@uomosul.edu.iq	
Module Leader's Acad. Title	Asst.Prof.	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Alaa A. Nasar	**e-mail**	E-mail	
Peer Reviewer Name	Anmar AL-Talb	**e-mail**	E-mail	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Surveying I aims to teach students how to measure distances through obstacles, construction and adjustment of levels, Measurement a long straight line offset, Methods of locating a point or the types of coordinates, Systematic or accumulation errors for tape, Reciprocal leveling, Determine Contour Interval and Contour Line Values, determine the level of the sewer, and computation of area (regular and irregular figures) by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After studying this course, the students should be able to: 1- To understand different types of survey. 2- To understand plane surveying instruments such as: tapes, levels. 3- To choose appropriate equipment for specific survey measurements. . 4-Interpret the disclosure and balancing in measurements. 5-To calculate areas using different methods 8- Contour mapping using different methods. 9- To determine the level of the sewer
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: Surveying by tape</u> Surveying by tape: Measurement a long straight line, Measurement a long straight line offset, How to draw a perpendicular on survey line when the point is on the line, How to draw a perpendicular from point out of the straight line, By cross staff, Optical square . Methods of locating a point or the types of coordinates, Rectangular coordinates, Focal coordinates, Angular coordinate, Polar coordinates [15 hrs]

	Systematic or accumulation errors: Correction of tape for standardization, Correction for slope, Correction for temperature, Correction for sag, Correction for pull or tension . [6 hrs] Obstacles : Those which can be measured a cross but cannot be seen a cross, Those which can be seen a cross but cannot be measured a cross, Those can neither be seen a cross nor be measured a cross. [12 hrs] <u>Part B - Levelling</u> Levelling : Level, Horizontal surface, Horizontal line, Bench mark (B.M) , Simple levelling, Procedure in levelling, Rise and fall method, Height of collimation method [15 hrs] Cross-sections , contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring [6 hrs] Reciprocal leveling, Curvature and Refraction, [6 hrs] Sewer [6hrs] Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and Irregular figures [9hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Surveying by tape
Week 2	Methods of locating a point or the types of coordinates, Quiz No.1

Week 3	Systematic or accumulation errors
Week 4	Systematic or accumulation errors: Correction for sag, Correction for pull or tension
Week 5	Obstacles
Week 6	Levelling, Projection of building
Week 7	Mid-term Exam
Week 8	Procedure in levelling, Rise and fall method,
Week 9	Height of collimation method
Week 10	Cross-sections, Quiz No.2
Week 11	contouring, Gridding or (The methods of squares), Radiating lines, Direct contouring
Week 12	Reciprocal leveling,
Week 13	Curvature and Refraction, Sewer
Week 14	Sewer
Week 15	Areas , Mechanical integration – the planimeter, Areas enclosed by straight lines , and Irregular figures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Create a straight line using tape
Week 2	Lab 2: Layout a building on graph paper
Week 3	Lab 3: cross section
Week 4	Lab 4: Level
Week 5	Lab 5: Profile levelling
Week 6	Lab 6: fly levelling
Week 7	Lab 7: cross section

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Surveying (A.Bannister & S.Raymond)	Yes

Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

Module Information
معلومات المادة الدراسية

Module Title	Computer programming (MatLab)		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ahmed younis Mohammed	**e-mail**	a.altaee@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	students in the dams stageThe computer programing (MATLAB) is the basic subject for second- and water resources engineering department that from this subject student will learn and practice to computer programming by MATLAB language to be able program and solve question by programming it in MATLAB language.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5. learn and practice to computer programming. 6. Solve problems in computer programming
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, to matlab programming [15 hrs] input output statements- input statements – practical examples and questions [15 hrs] control statements practical examples and questions [15 hrs]

	library function-practical examples and questions [15 hrs] logical statements – practical examples and questions. [15 hrs] matrix – introduction- practical examples and questions, [10 hrs] applied engineering numerical methods for solving equation- practical examples and questions [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	details – introduction to matlab programming input output statements- input statements – practical examples and questions
Week 2	statements – practical examples and questions input output statements- disp
Week 3	control statements practical examples and questions control statements – if statements-practical examples and questions statements-practical examples and questions control statements – if-else
Week 4	statements-practical examples and questions control statements – if-elseif-else-end statements-practical examples and questions control statements – for-end
Week 5	library function-practical examples and questions
Week 6	logical statements – practical examples and questions logical statements – and-or-not statements-practical examples and questions
Week 7	Mid-term Exam

Week 8	matrix – introduction- practical examples and questions
Week 9	plotting using matlab plotting statements- practical examples and questions
Week 10	applied engineering numerical methods for solving equation- practical examples and questions
Week 11	applied engineering numerical methods for solving equation- practical examples and questions
Week 12	applied engineering numerical methods for solving equation- practical examples and questions
Week 13	applied engineering numerical methods for solving equation- trail and error method- mid way method- practical examples and questions
Week 14	applied engineering numerical methods for solving equation-Newton Raphson method- practical examples and questions
Week 15	methods- practical examples and applied engineering numerical methods for integration - trapezoidal questions
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: control statements practical examples and questions control statements – if statements-practical examples and questions
Week 2	Lab 2: logical statements – practical examples and questions
Week 3	Lab 3: matrix – introduction- practical examples and questions
Week 4	Lab 4: plotting using matlab plotting statements- practical examples and questions
Week 5	Lab 5: applied engineering numerical methods for solving equation- practical examples and questions
Week 6	Lab 6: applied engineering numerical methods for solving equation-Newton Raphson method- practical examples and questions
Week 7	methods- practical examples and Lab 7: applied engineering numerical methods for integration - trapezoidal questions

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Advanced Mathematics and Mechanics Applications Using Matlab 2005	No

Recommended Texts	An Introduction to Programming and Numerical Methods in MATLAB S.R. Otto and J.P. Denier 2005	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/Matlab-programming	

Module Information
معلومات المادة الدراسية

Module Title	إنشاء المباني	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Samer same Majeed	**e-mail**	s.gasgous@uomosul.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	MSc
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding the stages of constructions of buildings. 2. To understand steps of implementation. 3. This course deals with the basic concept of building materials. 4. This is the basic subject standard specifications of building materials. 5. To understand how to calculating weights of concrete mix materials. 6. To perform types of stresses on hardened concrete.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the stages of construction of buildings. 2. List the various terms associated with concrete. 3. Summarize what is meant by construction material tests. 4. Discuss the reaction and involvement of buildings.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Buildings constructions. General introduction of buildings / stages of construction of buildings / steps of implementation / types of buildings / mechanical equipment used in earthworks. [15 hrs] Methods of groundwater discharge / Nature of soil and their relationship to foundations / Soil classification / Types of foundations / Piles foundation / Cement types. [15 hrs] Cement components / aggregate grading / Standard specifications of aggregate / additives / Concrete properties before and after the hardening/Types of stresses on hardened concrete. [10 hrs] Dimensional and volume changes in concrete / work and production of concrete / methods of calculating weights of concrete mix materials. [15 hrs] Concrete Placement and Grading / Maturation of concrete [6 hrs] Part B - Construction materials Technology. Brick and block works, Properties of fresh concrete, Stone works. [15 hrs] Brick tests, Formwork and scaffolding, Test compressive strength of concrete, lintels, beams and columns. [7 hrs] Block test, Floors and ceilings, Tiles tests, Steel reinforcement bars tests, Moisture blocker works. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	General introduction of buildings / stages of construction of buildings / steps of implementation / types of buildings / mechanical equipment used in earthworks.
Week 2	Methods of groundwater discharge / Nature of soil and their relationship to foundations / Soil classification.
Week 3	Types of foundations / Piles foundation / Cement types / Cement components.
Week 4	Aggregate grading / Standard specifications of aggregate / additives / Concrete properties before and after the hardening.
Week 5	Types of stresses on hardened concrete / dimensional and volume changes in concrete.
Week 6	Work and production of concrete / methods of calculating weights of concrete mix materials.
Week 7	Concrete Placement and Grading / Maturation of concrete.
Week 8	Brick and block works.
Week 9	Properties of fresh concrete.
Week 10	Stone works.
Week 11	Formwork and scaffolding.
Week 12	Lintels, beams and columns.
Week 13	Floors and ceilings.
Week 14	Moisture blocker works.
Week 15	Concrete mix design.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Sieve analysis of concrete aggregate.
Week 2	Specific gravity, Unit weight, moisture content of concrete aggregate.
Week 3	Find standard Softness and primary and final bonding time for cement paste.
Week 4	Find tensile and compressive strength of cement mortar for different ages.

Week 5	Properties of fresh concrete.
Week 6	Brick tests.
Week 7	Steel reinforcement bars tests.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	○ Construction of buildings, by Zuhair Saku and Artin Levon. ○ Test of materials, by Yousif Al Duaf.	Yes
Recommended Texts	○ Concrete mixtures, written by Dr. Ibrahim Ali Al Darwish, Dr. Abdul Wahab Awad. ○ Concrete Mix Design. ○ Appendix issued by the Laboratory of testing of construction materials including details and vocabulary for the testing of construction materials. ○ ACI code.	Yes

Module Information
معلومات المادة الدراسية

Module Title	**Fluid Mechanics 2**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial**

		☐ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ahmed younis Mohammed	**e-mail**	a.altaee@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	students in the dams and water stageThe fluid mechanics is the basic subject for second-resources engineering department that from this subject student will learn and practice to velocity and acceleration of water flow. Conservation of mass: the continuity equation. One two three-dimensional flow, steady and unsteady flow. One dimensional flow Euler's equation, Bernoulli's equation determination and Application of Bernoulli's equation (venturi meter, orifice and sluice gate). Momentum equation determination and application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. learn and practice to velocity measurements of water flow and calculated. 2. learn and practice to discharge measurements of water flow and calculated. 3. learn the conservation of mass: the continuity equation. 4. Determine discharge using Bernoulli's equation 5. Determine momentum by applying momentum equation. i 6. Appy of Bernoulli's and momentum equations on doing experiments in hydraulic laboratory.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, [15 hrs] **fluid kinematics** [15 hrs] types of fluid flow [15 hrs] types of flow lines [15 hrs] conservation of mass continuity equation [15 hrs] Types of head or energy of a flow in motion

	[10 hrs] Bernoulli's equation [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	**fluid kinematics**
Week 3	types of fluid flow
Week 4	types of flow lines
Week 5	conservation of mass continuity equation
Week 6	continuity equation
Week 7	Mid-term Exam
Week 8	Types of head or energy of a flow in motion
Week 9	Bernoulli's equation
Week 10	Application of Bernoulli's equation
Week 11	Tutorials and problem solve
Week 12	Pumps in the Bernoulli Equation
Week 13	The impulse-momentum equation
Week 14	Applied problems on Bernoulli's equation
Week 15	Applied problems on Pumps in the Bernoulli Equation and momentum
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Discharge Measurements in Pipes by Orifice Meter
Week 2	Lab 2: Discharge Measurements in Pipes by Venturi Meter
Week 3	Lab 3: Friction Factor in Pipes
Week 4	Lab 4: Discharge Measurement in Open Channel by Weirs
Week 5	Lab 5: Discharge Measurement in Open Channel by Weirs
Week 6	Lab 6: Hydraulic Jump in open channel
Week 7	Lab 7: Hydraulic Jump in open channel

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elementary fluid mechanics By: Vinnard 6th ed. 1981	Yes
Recommended Texts	fluid mechanics by MERLE C. POTTER, DAVID C. WIGGERT 2008	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/fluid-mechanics	

Module Information

معلومات المادة الدراسية

Module Title	**Surveying II**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	4
Administering Department	DWRE 224	**College**	Engineering
Module Leader	Dr. Omar Muqdad Abdulgany	**e-mail**	O.agha@uomosul.edu.iq
Module Leader's Acad. Title	Asst.Prof.	**Module Leader's Qualification**	Ph.D.

Module Tutor	Alaa A. Nasar	e-mail	E-mail

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Surveying II aims to teach students how to calculate the earthworks and reservoir volumes from contour maps, bearing of lines, designation of bearing, theodolite, construction and adjustment of the theodolite, measurement of angles, traverse surveys and their adjustment, tachometer, and total station.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1- To understand different types of survey (i). 2-To calculate areas using different methods(i) 3-To calculate volumes using different methods(i) 4- To determine and choose the appropriate method for calculating earthwork volumes (iii) 5- To use plane surveying instruments such as: Theodolite, Tachometry and Total station (iii) 6- To choose appropriate equipment for specific survey measurements (iii).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A: Area and Volumes</u> Introduction, Irregular figures, Give and take lines, Counting squares, Trapezoidal Rule, Simpson Rule (for odd number) [12 hrs] Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section),Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section Computation of volumes, mean areas, end areas, Prismoidal formula, The volume of a pyramid, The Volume of wedge, [15 hrs] Simpson′s Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines [9 hrs] <u>Part B – Theodolite and Tachometry, and Totalstation</u> Bearing, Designation of Bearings, whole circle system, Quadrantal system, Deflection angle, Fore and Back Bearings , Calculation of bearings from angles, Calculation of deflection angles from included angles. [18 hrs] The theodolite and traverse surveying, Traverse computations, Latitudes and departure, Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error [15 hrs] Tachometry, Optical principles, Determine the stadia interval factor [15 hrs] Total station [6hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies in surveying will be designed to engage students in the subject matter while equipping them with the necessary knowledge and skills. These will be encouraged students to participate in the learning process through activities that require them to apply their knowledge. This can be accomplished through problem-solving exercises, case studies, and fieldwork. Also, encourage students to work in groups to solve problems and complete projects. This approach promotes teamwork, communication, and critical thinking skills. Fieldwork will be Provided opportunities for students to engage in real-world surveying activities. This could involve conducting surveys, collecting data, and analyzing the results in the field.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Irregular figures, Give and take lines, Counting squares.
Week 2	Counting squares, Trapezoidal Rule, Simpson Rule (for odd number),Quiz No.1
Week 3	Volumes Earthwork calculation, Volumes from cross-sections, Sections level a cross (one level section), Sections with a cross fall (two level section).
Week 4	Sections part in cut and part in fill, Section of variable levels (three level section), Multi-level section
Week 5	Computation of volumes, mean areas, end areas, Prismoidal formula.
Week 6	The volume of a pyramid, The Volume of wedge.
Week 7	Simpson′s Rule for Volumes, Volumes from spot levels or (volume of Borrow), Volume from contour lines
Week 8	Mid-term Exam, Bearing, Designation of Bearings,
Week 9	Deflection angle, Fore and Back Bearings. Calculation of bearings from angles,
Week 10	Calculation of deflection angles from included angles, Quiz No.2
Week 11	The theodolite and traverse surveying, Traverse computations, Latitudes and departure.
Week 12	Closing error, Graphical adjustment, bowditch's rule, Transit rule, Distribution of the angular error
Week 13	Tachometry, Optical principles, Determine the stadia interval factor
Week 14	Tachometry, Optical principles , Total station
Week 15	Total station
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Planimeter
Week 2	Lab 2: Contour mapping using the surfer software
Week 3	Lab 3: Theodolite
Week 4	using Theodolite. Lab 4: Layout a building on graph paper
Week 5	Lab 5: Traverse surveying
Week 6	Tachometry. Lab 6: Measure distances using
Week 7	Lab 7: Total station

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Surveying (A.Bannister & S.Raymond)	Yes
Recommended Texts	Surveying by (S.K.Hussin and M.SNagaraj)	No
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Soil Physics**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**

Module Level	U	**Semester of Delivery**	2
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr. Abdulazeez Abdulbasit Mohamed	**e-mail**	Abdulazeez.mohammed@uomosul.edu.iq
Module Leader's Acad. Title	Instructor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Soil structure: arrangement and organization of soil particles 2. Soil porosity, permeability, and water movement 3. Understanding soil structure is important for optimizing soil management practices such as irrigation, drainage, and soil compaction. 4. To Understand as follows: movement, distribution water in the soil. 5. Understanding soil water dynamics such as infiltration, evaporation, water storage, and capillary rise. 6. Crucial for efficient water management
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding soil physical properties soil texture, structure, density, porosity, and water retention characteristics. 2. To Knowledge movement and distribution of water in soils. 3. Identify Soil water potential & how it affects plant growth. 4. Giving students basic idea about Soil-plant-water relationships 5. Enable the student to analyze laboratory data 6. Knowledge the student about soil temperature dynamics. 7. Learn students about the soils compaction characteristics. 8. Understand how soil compaction affects soil properties. 9. Develop the skills of student about thinking, analysis by soil space 10. Students should gain practical experience in conducting soil physics experiments, field measurements, and data collection.
Indicative Contents	Indicative content includes the following. Part – A Fundamental of Soil Physics - Introduction to Soil Physics - Definition and scope of soil physics Importance of soil physics in environmental science [12 hrs] Soil Phase - Soil physical properties and their measurement techniques Relationships [12 hrs]

المحتويات الإرشادية	Soil texture and particle size distribution – Soil composition and mineralogy Soil Water [10 hrs] – Soil structure and aggregation Soil water retention characteristics – Soil water content and potential Capillary rise – Soil water movement: infiltration, percolation, and drainage and capillary fringe [12 hrs] Part- B Soil Physics basic Evaporation and transpiration from soil [12 hrs] Soil Heat Transfer - Soil temperature variations and factors affecting soil Soil – Heat conduction, convection, and radiation in soils – temperature thermal properties and their measurement [12 hrs] Soil-Plant-Water Relationships Soil water availability and plant growth - Soil water Management [12 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Learning and teaching strategies play a crucial role in facilitating effective education in soil physics. Here are some common strategies that can be employed for both learning and teaching Lectures: Lectures provide an opportunity for instructors to present key concepts, in this field: theories, and principles of soil physics to students. They can use visual aids, demonstrations, and real-life examples to enhance understanding. Students can take notes, ask questions, and Laboratory Work: Practical laboratory engage in discussions during or after the lecture. sessions allow students to gain hands-on experience in conducting soil physics experiments and measurements. They can learn techniques for soil sampling, analysis of soil physical properties.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	introduction to soil physics
Week 2	Basic Soil physical properties
Week 3	Mass, volume relations and wetness
Week 4	The main components of the soil
Week 5	Soil water condition

Week 6	Moisture content
Week 7	Water efforts
Week 8	Soil Water Characteristic Curve
Week 9	Water flow through saturated soil
Week 10	Darcy's Law
Week 11	Permeability and Hydraulic conductivity
Week 12	General equations of flow
Week 13	Soil infiltration
Week 14	Soil sorptivity
Week 15	Water and energy balance
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Soil particles distribution
Week 2	Bulk density
Week 3	Moisture content
Week 4	Measurement of Soil Water Characteristic Curve (SWCS)
Week 5	Field capacity and Wilting point
Week 6	Saturated hydraulic conductivity
Week 7	Soil sorptivity

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	فيزياء التربة التطبيقية ترجمة وإعداد الدكتور سمير خليل الخفاف – مجلس البحث العلمي. بغداد – العراق	Yes
Recommended Texts	فيزياء التربة – تأليف الدكتور هشام محمود حسن جامعة الموصل / كلية الزراعة والغابات	Yes
Websites	Soil Physics by Dr. David L. Lindbo (University of Kentucky): This website offers lecture notes, course materials, and resources on various aspects of soil physics. It covers topics such as soil water, soil temperature, soil mechanics, and soil-plant relationships. Website: https://www.uky.edu/Ag/Soils/soils-pss443	

Module Information معلومات المادة الدراسية		
Module Title	**English Language II**	**Module Delivery**
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial**

			☐ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	2
Administering Department	DWRE	**College**		COE
Module Leader		**e-mail**		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor	Name (if available)	**e-mail**		E-mail

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims and Learning Outcomes	Students will be able to: 7. Distinguish between dependent, Independent, and Integrated essays. 8. Find the topic and the thesis statement of short essays. 9. Identify the main ideas from the introduction paragraph. 10. Identify the main ideas from the body paragraph. 11. Find the supporting details from the introduction paragraph. 12. Find the supporting details from the body paragraph. 13. Draw an outline to link the ideas, supporting details, and essay topic. 14. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 15. Write the introduction paragraph on basis of the thesis statement and main ideas. 16. Build the body paragraphs based on main ideas and supporting details. 17. Write the introduction paragraph based on the main ideas. 18. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs] - Analyzing academic essays according to the standard structure of academic essays. **Idea Maps:** [3 hrs] - Filling the idea maps from the major information extracted while reading an essay. **Responding to an essay question:** [4 hrs] - Building an outline using personal ideas in response to an essay question. **Writing Paragraphs:** [6 hrs] - Writing thesis statement. - The Introduction Paragraph. - The Body Paragraphs. **Essay Conclusion:** [3 hrs] - Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs **Transition words and connection phrases:** [3 hrs] **Dependent essays:** [3hrs]

	- Introduction to essays based on figures, tables, diagrams, and processes

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The approach to be followed here is to motivate students to analyze previously written model essays to understand the standard structure of academic essays then implement the same procedures to build their own essays.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview of Academic Essays Independent, Dependent, and Integrated essays Structure of academic essays
Week 2	Structure of academic essays
Week 3	Topic sentence and thesis statement Identifying topic sentence and thesis statement of academic essays.
Week 4	Main Ideas: Identifying the main Ideas of academic essays.
Week 5	Supporting Details: Identifying the supporting details
Week 6	Essay outlines: Building Essay outlines using idea maps
Week 7	Essay Questions: Responding to essay questions by making personal notes
Week 8	: Writing a thesis statement or topic sentence using personal thoughts. Topic Sentence
Week 9	Personal Thoughts: Using personal thoughts to express main ideas and supporting details in response to an essay question.
Week 10	Idea Map Creation: Building an idea map of an essay question.
Week 11	Transition words and sentence starters Increasing the fluency, coherence, and smooth transition of thoughts using sentence starters and transition words.
Week 12	Writing the Introduction: Combining the thesis statement and main ideas together to build the introduction paragraph.
Week 13	Writing the Conclusion
Week 14	Introduction to dependent writing tasks
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: There are no laboratory experiments.
Week 2	Lab 2: There are no laboratory experiments.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ No Textbook is required for this course. Supplemental materials will be provided by provided by the instructor.	
Recommended Texts	➢ *Sharpe, P. J. (2009). Barron's TOEFL iBT. Barron's Educational Series.* ➢ *Lougheed, L. (2016). Barron's Ielts with Mp3 Cd. Barron's.*	No

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics III**			**Module Delivery**	
Module Type	**Basic learning activities**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE 211**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		2	**Semester of Delivery**		1
Administering Department		Dams and Water Recourses	**College**	Engineering	
Module Leader	Muhanad Talal Yousif		**e-mail**	Mohanad_ALsheer@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Dr. Anmar Altalib	**e-mail**	Anmar.altalib@uomosul.edu.iq	
Scientific Committee Approval Date		10/06/2023	**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of Polar coordinates system and its applications. 2. To understand Vectors and Geometry of Space, Scalar Product, Cross Product 3. This course deals with the basic concept of Partial Differentiation. 4. To understand Double Integrals and its applications. 5. To perform Infinite Sequences and Series analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrimination between Polar coordinates system and cartesian coordinates system. 2. Learn how to calculate the area and curve length in Polar coordinates system. 3. Describe the vector components and the products between two vectors. 4. Identify Partial Differentiation and Second – Order Partial Differentiation. 5. Explanation the double integral. 6. Define the Infinite Sequences and Series.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Polar coordinates system, Graphing in polar coordinates system, Area in polar coordinates system, Curve length in polar coordinates system. [16 hrs] Vectors and Geometry of Space, Space coordinate and space vector, Scalar Product (Dot Product) and Applications (line equation in the plane), Cross Product (Vector Product) and Applications (the distance from appoint to a line in space) . [24 hrs] Partial Differentiation, Second – Order Partial Differentiation, The chain rule for partial derivatives. [24 hrs] Double Integrals and its applications, The methods of least squares, Infinite Sequences and Series. [24 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of exercises involving some problems that are interesting to the students in mathematics scope.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Polar coordinates system, Graphing in polar coordinates system
Week 2	Area in polar coordinates system, Curve length in polar coordinates system
Week 3	Vectors and Geometry of Space, Space coordinate and space vector
Week 4	Scalar Product (Dot Product) and Applications (line equation in the plane)
Week 5	Cross Product (Vector Product) and Applications (the distance from appoint to a line in space)
Week 6	Plane Equation in space, Angles between planes
Week 7	Partial Differentiation, exercises
Week 8	Second – Order Partial Differentiation, exercises
Week 9	The chain rule for partial derivatives
Week 10	Directional Derivatives in the plane
Week 11	Tangent plane and normal line of surface
Week 12	Extreme (Maxima and Minima) values and Saddle points.
Week 13	Double Integrals and its applications
Week 14	The methods of least squares
Week 15	Infinite Sequences and Series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Calculus". Ross L Finney and George B. Thomas. Copyright by Addison Wesley Publishing Company, 1990.	Yes
Recommended Texts	"THOMAS CALCULUS" George B. Thomas. Printed in the United States of America., 2014.	No

المستوى الثالث

مخطط مهارات المنهج																							
يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم																							
				مخرجات التعلم المطلوبة من البرنامج																			
السنة / المستوى	رمز المقرر	اسم المقرر	أساسي أم اختياري	الاهداف المعرفية				الاهداف المهاراتية الخاصة بالبرنامج				الاهداف الوجدانية والقيمية				المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي)							
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4	د1	د2	د3	د4				
المستوى الثالث / الفصل الاول	DWR 340	تحليلات هندسية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 341	هيدروليك	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 342	هيدرولوجيا المياه السطحية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 343	اسس الري وعملياته	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 344	نظرية المنشآت I	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 345	تصاميم الخرسانة	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 346	ميكانيك التربة I	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 347	تطبيقات الحاسوب في الموارد المائية I	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 391	ميكانيك الانهر	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 394	الطرق الإحصائية في الهيدرولوجيا	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
المستوى الثالث / الفصل الثاني	-	اللغة الإنكليزية - المتوسط	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	ENGE320	التحليلات العددية	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 348	القنوات المفتوحة والآلات الهيدروليكية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 349	هيدرولوجيا المياه الجوفية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 350	هندسة البزل	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 351	ميكانيك التربة II	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 352	الاستهلاك والمقننات المائية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 392	نظرية المنشآت II	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 393	تصميم الخرسانة المسلحة	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 395	قياسات الجريان الحقلي وتحليلاته	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				
	DWR 396	تطبيقات الحاسوب في الموارد المائية II	اختياري	√	√	√	√	√	√	√	√					√	√	√	√				

المقررات الدراسية لقسم هندسة السدود والموارد المائية / كلية الهندسة / جامعة الموصل

المستوى الثالث

المستوى الدراسي الثالث (الفصل الاول)									
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات القسم	اجباري	تحليلات هندسية	Engineering Analysis	2	1	2	Calculus IV	DWR 340	
	اجباري	هيدروليك	Hydraulics	2	-	2	Fluid Mechanics II	DWR 341	
	اجباري	هيدرولوجيا المياه السطحية	Surface Hydrology	2	-	2	-	DWR 342	
	اجباري	اسس الري وعملياته	Irrigation Principles and Practices	2	-	2	Water Management and Land Reclamation	DWR 343	
	اجباري	نظرية المنشآت I	Theory of Structures I	2	1	2	Strength of Materials II	DWR 344	
	اجباري	تصاميم الخرسانة	Concrete Design	2	-	2	Strength of Materials II and Construction Material Technology	DWR 345	
	اجباري	ميكانيك التربة I	Soil Mechanics I	1	2	2	Water Management and Land Reclamation	DWR 346	
	اجباري	تطبيقات الحاسوب في الموارد المائية I	Computer Applications in Water Resources I	1	2	2	-	DWR 347	
	اختياري	ميكانيك الانهر	River Mechanics	2		2	-	DWR 391	يختار الطالب مقرر واحد, عدد الوحدات المطلوبة = 2 وحدة
	اختياري	الطرق الإحصائية في الهيدرولوجيا	Statistical Methods in Hydrology	2	-	2	-	DWR 394	
	مجموع ساعات ووحدات الفصل الدراسي الأول			16	6	18			

المستوى الدراسي الثالث (الفصل الثاني)									
اسم المتطلب	نوع المتطلب (اجباري – اختياري)	اسم المقـــرر		عدد الساعات النظرية	عدد الساعات العملية	عدد الوحدات	الممهد ان وجد	رمز المقرر	الملاحظات
		باللغة العربية	باللغة الإنكليزية						
متطلبات الجامعة	اجباري	اللغة الإنكليزية - المتوسط	English Language - Intermediate	2	---	2	-	-	
متطلبات الكلية	اختياري	التحليلات العددية	Numerical Analysis	2	---	2	Calculus I and Calculus II	ENGE320	اجباري لطلبة القسم
متطلبات القسم	اجباري	القنوات المفتوحة والآلات الهيدروليكية	Open Channels and Hydraulic Machines	2	---	2	Hydraulics	DWR 348	
	اجباري	هيدرولوجيا المياه الجوفية	Groundwater Hydrology	2	---	2	Surface Hydrology	DWR 349	
	اجباري	هندسة البزل	Drainage Engineering	2	---	2		DWR 350	
	اجباري	ميكانيك التربة II	Soil Mechanics II	1	2	2	Soil Mechanics I	DWR 351	
	اجباري	الاستهلاك والمتطلبات المائية	Consumptive Use and Water Duty	2	---	2	Irrigation Principles and Practices	DWR 352	
	اختياري	نظرية المنشآت II	Theory of Structures II	2	---	2		DWR 392	يختار الطالب مقرر واحد, عدد الوحدات المطلوبة – 2 وحدة
	اختياري	تصميم الخرسانة المسلحة	Reinforced Concrete Design	2	---	2	Concrete Design	DWR 393	
	اختياري	قياسات الجريان الحقلي وتحليلاته	Field Flow Measurements and Analysis	2	---	2		DWR 395	يختار الطالب مقرر واحد, عدد الوحدات المطلوبة = 2 وحدة
	اختياري	تطبيقات الحاسوب في الموارد المائية II	Computer Applications in Water Resources II	2	---	2		DWR 396	
	مجموع ساعات ووحدات الفصل الدراسي الثاني			17	2	18			

ملاحظة: التدريب الصيفي (Summer Training) من متطلبات التخرج المطلوبة بعد اكمال الطالب المستوى الثالث للفترة من 1 تموز إلى 31 تموز أو من 1 آب إلى 31 آب.

Module Information
معلومات المادة الدراسية

Module Title	**Engineering Analysis**	**Module Delivery**	
Module Type	**Compulsory**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	2
Administering Department	Dams and water resources Department	**College**	College of Engineering
Module Leader	Ali Ahmed Abdulmawjood	**e-mail**	aliabdulmawjood@uomosul.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	Msc
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Anmar Altalib	**e-mail**	anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	To introduce students to the concept of differential equations and their significance in engineering and scientific applications. To provide students with the necessary skills to solve first order differential equations using separation of variables, and to classify them as homogeneous, non-homogeneous, exact and non-exact D.E's. To teach students how to solve linear and non-linear first order differential equations, as well as higher order differential equations. To familiarize students with the solution of second and higher order linear differential equations, with both constant and variable coefficients, and to teach them how to apply the variation of parameters method. To provide students with an understanding of simultaneous linear differential equations and their applications in engineering. To equip students with the ability to analyze physical and engineering problems by setting up and solving differential equations. To impart an understanding of Laplace transforms and how they can be used for the solution of differential equations. Overall, this course aims to provide a thorough understanding of differential equations and their use in various engineering and scientific applications. By the end of this module, students should be able to solve a variety of differential equations, both analytically and numerically, and apply this knowledge to real-world problems.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course students will be able to: 1. Define differential equations and classify them based on their degree, order, and formation. 2. Solve first-order differential equations using separation of variables. 3. Analyze and solve homogeneous, non-homogeneous, exact, and non-exact differential equations. 4. Classify differential equations as linear or non-linear and solve linear first-order differential equations. 5. Solve higher-order differential equations of varying degrees. 6. Solve second- and higher-order linear differential equations using the characteristic equation and general solutions. 7. Solve second- and higher-order linear differential equations with constant coefficients. 8. Solve second- and higher-order linear differential equations with variation of parameters. 9. Solve a system of linear differential equations using matrix methods. 10. Apply first-order differential equations to physical and engineering problems. 11. Utilize second-order differential equations to solve physical and engineering problems. 12. Apply second-order differential equations to model physical systems in various engineering applications. 13. Derive solutions for second-order differential equations in a specific engineering domain. 14. Use Laplace transforms to solve differential equations, including finding solutions from initial and boundary conditions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Definition, Forming, Order and Degree of Differential Equation [4hr] 2. Solution of the first order D.E Separation of variables [4hr] 3. Homogeneous, non-homogeneous, Exact and not exact D.E [4hr] 4- Linear and nonlinear first order D.E 5. First order and higher degree D.E [4hr] 6. Solution of second and higher order linear D.E [4hr] 7. Solution of second and higher order linear D.E with constant coefficient 8. Solution of second and higher order linear D.E with variation of parameter [4hr] 9. Simultaneous linear D.E [4hr] 10. Physical and engineering application on first order D.E [8hr] 11. Physical and engineering application on second order D.E [8hr] 12. Laplace TransformDerivative of Newton forward and backward differences [8hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Defintion, Forming,Order and Degree of Differential Equation
Week 2	Solution of the first order D.E.Separation of variables
Week 3	Homogeneous, non-homogeneous Exact and not exact D.E
Week 4	Linear and nonlinear first order D.E
Week 5	First order and higher degree D.E
Week 6	Solution of second and higher order linear D.E
Week 7	Solution of second and higher order linear D.E with constant coefficient
Week 8	Solution of second and higher order linear D.E with variation of parameter
Week 9	Simultaneous linear D.E
Week 10	Physical and engineering application on first order D.E
Week 11	Physical and engineering application on first order D.E
Week 12	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 13	Physical and engineering application on second order D.E Physical and engineering application on second order D.E
Week 14	Laplace Transform
Week 15	Laplace Transform
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Theory and Problems of Differential Equations	Yes
Recommended Texts	• By Frank Ayres, JR,PhD • Advanced Engineering Mathematics By Dass	No
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Structures**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	2
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr. Mohammed M. Khalaf	**e-mail**	mohammedmukhlifkhalaf@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. Study the basic principles for structures. 2. Analyze the statically determinate structures. 3. Determine the elastic deformations of the statically determinate structures by using different methods. 4. Solve the indeterminate statically structures by using different methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Find out stability and determinacy of structures, Analyze the statically determinate structures 2. 3. Evaluate the elastic deformation of structures by virtual work (unit load) method Evaluate the elastic deformation of structures by Castigliano`s first theorem method 4. 5. Analyze the statically indeterminate structures by consistent deformation method 6. Analyze the statically indeterminate beams and frames by least work method 7. Analyze the statically indeterminate beams and frames by slope-deflection method 8. Analyze the statically indeterminate beams and frames by moment distribution method
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Determinate Structures Stability and determinacy of structures, Analysis of the statically determinate structures. [4 hrs] The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method. [4 hrs]

	The elastic deformation of trusses by virtual work (unit load) method. [4 hrs] The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method. [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs]  Part B - Indeterminate Structures Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation [4 hrs] The elastic deformation of trusses by Castigliano`s first theorem method. [4 hrs] Analysis the statically indeterminate beams by consistent deformation method [4 hrs] Analysis the statically indeterminate frames by consistent deformation method [4 hrs] Analysis the statically indeterminate beams by least work method [4 hrs] Analysis the statically indeterminate frames by least work method [4 hrs] Analysis the statically indeterminate beams by slope-deflection method [4 hrs] Analysis the statically indeterminate frames by slope-deflection method method [4 hrs] Analysis the statically indeterminate beams by moment distribution method [4 hrs] Analysis the statically indeterminate frames by moment distribution method [4 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Stability and determinacy of structures, Analysis of the statically determinate structures
Week 2	The elastic deformation of beams by virtual work (unit load) method, The elastic deformation of frames by virtual work (unit load) method
Week 3	The elastic deformation of trusses by virtual work (unit load) method
Week 4	The elastic deformation of beams by Castigliano`s first theorem method, The elastic deformation of frames by Castigliano`s first theorem method
Week 5	The elastic deformation of trusses by Castigliano`s first theorem method
Week 6	Exam I
Week 7	Analysis the statically indeterminate beams by method of consistent deformation, Analysis the statically indeterminate frames by method of consistent deformation

Week 8	Analysis the statically indeterminate trusses by method of consistent deformation
Week 9	Analysis the statically indeterminate beams by least work method
Week 10	Analysis the statically indeterminate frames by least work method
Week 11	Analysis the statically indeterminate beams by slope-deflection method
Week 12	Analysis the statically indeterminate frames by slope-deflection method
Week 13	Analysis the statically indeterminate beams by moment distribution method
Week 14	Analysis the statically indeterminate frames by moment distribution method
Week 15	Exam II
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Elementary Theory of Structures, YUAN-YU HSIEH, PRETICE-HALL, 1980.	Yes
Recommended Texts	Hibbeler R. C. (2012). Structural analysis (8th ed.). Pearson/Prentice Hall.	No

Module Information
معلومات المادة الدراسية

Module Title	**Hydraulic**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	1
Administering Department	DWR	**College**	ENG
Module Leader	Dr. Mena Ahmed Alsawaf	**e-mail**	m.alsawaf@uomosul.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	On successful completion of this course students will be able to: 1. Recognize the common types of flow in pipes 2. Apply the basic concepts of sciences and engineering to solve issues associated with the flow in pipes 3. Formulate the main parameter to design a model related to flow of water 4. Develop and solve design problems and analyze the data to evaluate the pipes used in supply system 5. Identify and analyze the solution of a problem occurs in flow over a hydraulic structure
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to create a model (physical or numerical) and select the relevant variables. 2. Understand the flow in pipes and their types and what are their application. 3. Summarize what is meant by a shear stress in pipes, friction force. 4. Discuss the usage of non-circular pipes and how to deal with them theoretically. 5. Describe the different types of fitting added to the system of water supply. 6. Define the connection between pipes and how to deal with them hydraulically, in term of parallel, series and branched. 7. Identify the basic of designing the network of water supply system. 8. Discuss the requirements and limitation of water supply system. 9. Discuss the various properties and types of pumps. 10. Explain the connection of pumps to a system. 11. Identify the main characteristic of pumps and their curves.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Dimensionless Analysis and Similarity

	Defining the main variables of each problem and learn how to group them in order to solve the case in easiest way, identify the main forces affected on fluid flow and use their terms in solve relevant cases. Learn the applications of Reynolds No., Froude No. Webber No., Euler No. and Mach No., then, apply them in many applications. Dynamic similarity and geometric similarity. [10 hrs] Part B – Flow in a section of a Pipe Flow in pipes and the fundamental equations, major losses in pipes, classify the flow types, identify the main formulas for each case of flow types. distributions of velocity and shear in section of a pipe. Laminar flow: applications and relevant formulas. Turbulent flow: applications and relevant formulas in both cases of hydraulically smooth or rough. Using Moody diagram to indicate the roughness, the flow in non-circular pipes. [35 hrs] Part C – Flow in Pipes Hydraulic grad line, the losses due to fitting in a system of pipes, valves, bending, expansions, contractions and meters. Connection between pipes and tanks, the affected discharge and energy, pipes in parallel, pipes in series, equivalent pipes, branched channel, and computing the distributed discharge in a network. [25 hrs] Part D – Pumps Adding a pump in a system, its energy and power, the type of pumps, how pumps connect parallel and series, learning how to use their characteristics curves. [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, class works and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Dimensionless analysis
Week 2	Modelling in pipes and open channel
Week 3	Flow in pipes, general equations
Week 4	Laminar and turbulent flow in pipes
Week 5	Distribution of velocities and shear stress in pipes
Week 6	Flow in smooth pipes, seventh root law
Week 7	Flow in rough pipes
Week 8	Classification of rough and smooth flow in pipes

Week 9	Flow in non-circular pipes
Week 10	Minor losses of the fittings, flow in orifice and syphon
Week 11	Connect pipes in parallel and series
Week 12	Branched channel, connection with tanks
Week 13	Hardy- cross method to measure discharge in each pipe of a networks
Week 14	Pumps: introduction, connections and efficiency
Week 15	Pumps in parallel and series
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Vennard, J.K., 1963. Elementary fluid mechanics. 4th edition.	Yes
Recommended Texts	Rajput, R.K., 2004. *A textbook of fluid mechanics and hydraulic machines*. S. Chand Publishing.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering	

Module Information
معلومات المادة الدراسية

Module Title	**Surface water Hydrology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	1
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Dr.Rasha M. Sami Fadhil	**e-mail**	Rasha.fadhil@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Surface Water hydrology is essential for third-stage dams and water resources engineering students in order to • Provides an introduction to hydrological processes; measurements and modelling. It focuses on practical applications of hydrology • Quantify the hydrologic processes and integrate them into hydrologic design procedures. • know and understand the basic principles and equations used for surface water hydrology, and the main characteristics of the different types of hydrologic simulators.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Overview of essential concepts encountered in hydrological systems. • Developing a sound understanding of concepts as well as a strong foundation for their application to real-world, in-the-field problem solving. • Acquisition of knowledge by learning new concepts, and properties and characteristics of water and surface water in specific

	• Cognitive skills through thinking, problem solving and use of experimental work and inferences • Numerical skills through application of knowledge in basic mathematics and supply issues. • Student becomes responsible for their own learning through solution of assignments, laboratory exercises and report writing • Solving problems in hydrology and making decisions about hydrologic issues that involve uncertainty in data /incomplete data, and the variability of natural materials.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Fundamentals of Surface Water Hydrology .(6hrs) • Meteorological data (Humidity, temperature, radiation and wind)(6hrs) • Precipitation.(6hrs) • Evaporation and transpiration.(6hrs) • Infiltration and percolation.(7hrs) • Hydrograph .(8hrs) • Rainfall-Runoff process (Surface water runoff). (8hrs) • Design Flood estimations.(8hrs) • Flood routing .(8hrs) • Modelling Watershed Hydrology. (8hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The essential strategy of this module is to motivate students to • use real-world data to develop a water budget for unfamiliar basins. • Identify interconnections in hydrological systems and predict changes. • Predictions of hydrological terms influencing the hydrological cycle. • Collection of data, analysis and interpretation.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Hydrological definition, The hydrological cycle, Global Water Balance The water balance equation or the hydrological equation Google earth software
Week 2	Engineering applications of hydrology, Typical failure factors for hydraulic installations Google earth software
Week 3	Climate elements: Introduction, Temperatures, solar radiation Evaporation, moisture, Atmospheric pressure, and wind. Google earth software
Week 4	Precipitation: Forms of precipitation, Precipitation measurement, Precipitation measuring grid, Initialize the information, Check the smoothness of records, Precipitation measurement methods, The hectograph Global mapper software
Week 5	Precipitation losses: The loss from the rainfall, Evaporation process, Evaporation gauges, Evaporation stations Global mapper software
Week 6	Empirical evapotranspiration equations, Analytical methods for estimating evapotranspiration. Global mapper software
Week 7	Runoff: Factors affecting the value or volume of surface runoff, Division of surface runoff WMS software
Week 8	**First Monthly Exam**
Week 9	Hydrograph, The flow characteristics of the streams Empirical equations, Flow Curve Characteristics – Sustainability, Cumulative (mass) flow curve. WMS software
Week 10	Calculation of storage volume, Calculations of an accepted order WMS software
Week 11	Hydrograph: Introduction, Factors affecting flood hydrograph, Hydrograph Components, Separation of the hydrograph, effecting rainfall

	WMS software
Week 12	Standard hydrograph, Derivation of the standard hydrograph Standard hydrographs of different durations, The uses, and limitations of the standard hydrograph. WMS software
Week 13	Flood routing Microsoft Excel
Week 14	Reservoir routing- channel routing Microsoft Excel
Week 15	**Second monthly exam.**
Week 16	**The preparatory week before the Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ward, Roy C., and Mark Robinson. *Principles of hydrology*. Vol. 367. London: McGraw-Hill, 1975.	Yes
Recommended Texts	Raghunath, H. M. (2006). *Hydrology: principles, analysis and design*. New Age International. Hiscock, K. M., & Bense, V. F. (2014). *Hydrogeology: principles and practice*. John Wiley & Sons.	Yes
Websites	https://www.youtube.com/watch?v=bOkzVV9VLRI https://www.ldeo.columbia.edu/~martins/hydro/syl_p.html	

Module Information
معلومات المادة الدراسية

Module Title	Irrigation principles and practices		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Level	3U	**Semester of Delivery**	1
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr.Anmar Abdulaziz Majeed	**e-mail**	Anmar.altalib@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Ass.Lec.Alaa Ismaeel Naser	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1.To understand Irrigation – world wide 2. To understand Sources and storage of Irrigation water 3. To understand the Basic soil-water relations 4.To understand the Flow of water onto and through soils. 5. To understand the Measurement of soil moisture. 6. To understand the Irrigation water conveyance .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how to efficient use of water. 2. Securing the plant against short-term droughts. 3. Giving students a simple idea about irrigation methods. 4. Learn about the most important sources of irrigation water and methods of storing it. 5. Identify ways to reduce evaporation from reservoirs. 6. Finding solutions to the problems of Water voracious plants. 7. Taking an idea of the safe discharges from underground irrigation tanks. 8. Study the basic relationships between soil and water. 9. Learn about the most important methods of measuring soil moisture. 10. Study of the flow of water in and through the soil. 11. Identify the problems of salinity in soil and water.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – irrigation principal

	Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation - flood water - ground water [5 hrs] The Future of Growth and Expansion in Irrigation - Fields of Irrigation Science - Irrigation Economics [2 hrs] Irrigation water sources and storage - rainfall on valleys - studies of water resources - surveys in snowy areas and their benefits - surface reservoirs- Small dams - sedimentation (accumulation of sediments) in reservoirs - reduction of evaporation losses - problems of aquatic (aquatic plants) - industrial rain or sowing of clouds - development of river pumping Transferring. [5 hrs] saline water to fresh water - Importance of ground water (groundwater) - Feeding or recharging aquifers - Safe disposal of underground irrigation tanks Feasibility of groundwater development - changes in groundwater storage - groundwater studies and research. [5 hrs] Revision problem classes [2 hrs] <u>Part B – irrigation practices</u> Fundamentals Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight- Pore space - leaching - soil water input - permeability - soil depth - plant food compounds - soluble excess salts- Surface tension - Tensile stresses (tension compressors) - Soil moisture stress - Soil moisture content - Soil water classification and availability (availability). [6 hrs] Fill the available ground water tank - the natural properties represented by the soil- Soil moisture measurement - Drilling of soil for soil samples - Soil resistance for penetration - Appearance and texture of soil as evidence of moisture content-Determination of moisture content of soil by weight method - Exploitation of electrical properties of porous mold - Tensiometers - Neutron method for soil moisture measurement - Thermal properties - Error in sample. [6 hrs] Flow of water in and through soil - Energy in flowing water - Bases to measure pressure energies in saturated soil - Measuring soil permeability- Characteristics of soil water input (absorption) - Constant pressure permeability meter - Variable pressure permeability meter - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions- . [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Through this course, we try to help the student to understand the foundations of the irrigation process by learning everything related to irrigation water sources, and methods of ancient and modern irrigation, as well as linking the relationship between soil and water, and how water moves over and through the soil, while giving the student examples of all this from reality, with reference to The major irrigation projects in the city and the country and the irrigation methods used in each of them.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Irrigation in the world - irrigation since ancient times - dry areas in the world - definition of irrigation - precipitation - flood water - ground water
Week 2	The Future of Growth and Expansion in Irrigation - Fields of Irrigation Science - Irrigation Economics
Week 3	Irrigation water sources and storage - rainfall on valleys - studies of water resources - surveys in snowy areas and their benefits - surface reservoirs
Week 4	Small dams - sedimentation (accumulation of sediments) in reservoirs - reduction of evaporation losses - problems of aquatic (aquatic plants) - industrial rain or sowing of clouds - development of river pumping
Week 5	Transferring saline water to fresh water - Importance of ground water (groundwater) - Feeding or recharging aquifers - Safe disposal of underground irrigation tanks
Week 6	Feasibility of groundwater development - changes in groundwater storage - groundwater studies and research
Week 7	Soil and soil basic relationships - soil texture - soil structure (soil construction) - specific gravity (real weight) - specific weight
Week 8	Pore space - leaching - soil water input - permeability - soil depth - plant food compounds - soluble excess salts
Week 9	Surface tension - Tensile stresses (tension compressors) - Soil moisture stress - Soil moisture content - Soil water classification and availability (availability)
Week 10	Fill the available ground water tank - the natural properties represented by the soil
Week 11	Soil moisture measurement - Drilling of soil for soil samples - Soil resistance for penetration - Appearance and texture of soil as evidence of moisture content
Week 12	Determination of moisture content of soil by weight method - Exploitation of electrical properties of porous mold - Tensiometers - Neutron method for soil moisture measurement - Thermal properties - Error in sample
Week 13	Flow of water in and through soil - Energy in flowing water - Bases to measure pressure energies in saturated soil - Measuring soil permeability
Week 14	Characteristics of soil water input (absorption) - Constant pressure permeability meter - Variable pressure permeability meter - Input rate measurement (soil absorption of water) - Precipitation and movement of soil water during irrigation - Asymmetric and non-homogeneous soil in all directions -
Week 15	Salinity problem in soil - Climate and salinity - Sources of soluble salts and their accumulation - Use of salt water in irrigation - Criteria for irrigation water validity
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- Irrigation principles and practices , by V.E. Hansen ,O.W.Israelsen and G.F. Stringham, fourth edition, john wiley and sons., 1980.	Yes
Recommended Texts	-Design manual for irrigation &drainage- ministry of irrigation-Iraq (pencol)	yes
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Concrete Design**		**Module Delivery**
Module Type	**S**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Level	3	**Semester of Delivery**	Full
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr. Saddam M AHMED	**e-mail**	Ahmed.saddam@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Nil	**e-mail**	Nil

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	i. To understand concrete characteristics. ii. To understand safety and serviceability factors. iii. To understand the crack and uncrack concrete behavior. iv. To understand and apply engineering principles, science and mathematics to solve engineering problems. v. To understand the code provisions and enrich the design skills

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course the student shall be able to assess the: 1. Mechanical properties of concrete, and reinforcements, (i) 2. Safety and serviceability provision, (ii) 3. Behavior of reinforced concrete at working and ultimate loads, (iii) 4. Analysis and Design of simple beams and slabs by working stress method, (iv, v) 5. Analysis and Design of simple beams and slabs by ultimate strength design method, (iv, v) 6. Analysis and design of T beam, Doubly reinforced beam and continuous beams by Ultimate strength design method (USD), (iv, v) 7. Shear strength in beams and design of shear reinforcement, (iv, v) 8. Behavior of reinforced concrete columns, (iv, v) 9. Analysis and Design of short columns, (iv, v) 10. Analysis and Design of flat slab, (iv, v) 11. Analysis and design of flat slab with drop panels, (iv, v) 12. Analysis and Design of footings, (iv, v) 13. Analysis and design of Two-way slab and beams, (iv, v) 14. Procuration for seismic resistance moment frames, (v)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types. **[6hrs]** Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked **[6hrs]** Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses **[6hrs]** Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced Sections, Tension-Controlled Sections, and Compression-Controlled. **[6hrs]** Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs **[6hrs]** Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design); L-Shaped Beams **[6hrs]** Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear. **[6hrs]** Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design. **[6hrs]** Short column under axial and bending actions, Interaction diagram (m-p curves). **[6hrs]** Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods **[6hrs]** Design of flat slab with and without drop panels: Load Factors **[6hrs]** Design of Rectangular Beams and two-Way Slabs **[6hrs]** Design of footings, single, continuous and mat footings **[6hr]**

	Procuration for seismic resistance moment frames **[6hrs]** Design and analysis real case structures using computer software **[6hrs]**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Power point presentation and multimedia tools are used in classrooms; Examples and problems will be solved and illustrated on the classroom board; Tutorials are also organized to establish a closer contact with students. Students are encouraged to use the Internet to search for various topics, including contents of similar courses offered elsewhere. MS Excel software is used for preparing projects. Students can reach the teaching material, solved problems, data sheets, past exam papers etc. on the allocated Web site. The instructor will be happy to answer questions related to course content via email. Complex technical questions should be addressed in tutorial, during office hours, or by appointment. Emails must come from official University email addresses. The instructor will not respond to outside email addresses.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction; syllabus; Advantages and Disadvantages of Reinforced Concrete as a Structural Material; Mechanical properties of concrete; steel. Concrete and steel grading; design philosophy; Loading types.
Week 2	Introduction, Flexural Analysis of Beams (working): Cracking Moment; Elastic Stresses—Concrete Cracked
Week 3	Introduction, Flexural Analysis of Beams (Ultimate): Ultimate Moment; Yield Stresses
Week 4	Strength Analysis of Beams According to ACI Code: Design Methods; Strains in Flexural Members; Balanced Sections, Tension-Controlled Sections, and Compression-Controlled.
Week 5	Design of Rectangular Beams and One-Way Slabs: Load Factors; Design of Rectangular Beams; One-Way Slabs
Week 6	Analysis and Design of T Beams and Doubly Reinforced Beams: T Beams; Design of Doubly Reinforced Beams (positive and Negative Moment design); L-Shaped Beams
Week 7	Shear and Diagonal Tension: Shear Stresses in Concrete Beams; Design for Shear.
Week 8	Introduction to columns, Flexural Analysis of short columns (under axial loads), Load carrying capacity of short columns, ties design.

Week 9	Short column under axial and bending actions, Interaction diagram (m-p curves).
Week 10	Design of short columns subjected to bending and axial loads according to ACI Code: Design Methods
Week 11	Design of flat slab with and without drop panels: Load Factors
Week 12	Design of Rectangular Beams and two-Way Slabs
Week 13	Design of footings, single, continuous and mat footings
Week 14	Procuration for seismic resistance moment frames
Week 15	Design and analysis real case structures using computer software
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	○ Jack M., Russell B. (**2012**) "DESIGN OF REINFORCED CONCRETE", nine Edition, Wiley, ISBN: 978-1-118-12984-5, USA. (can be downloaded from the Course web page).	Yes
Recommended Texts	○ Gillesania, D.I.T. "FUNDAMENTALS OF CONCRETE DESIGN". Phils. DIT Gillesania, 2003. (can be downloaded from the Course web page).	yes
Websites	Google Classroom	

Module Information
معلومات المادة الدراسية

Module Title	**Principle of soil mechanics**			**Module Delivery**
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Level	**3**	**Semester of Delivery**		**Five**
Administering Department	Dam and water resources	**College**		Engineering
Module Leader	Dr. Zuheir Karabash	**e-mail**		Karabash@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Ibrahim M. Alkiki Professor	**e-mail**		i.alkiki@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The course aims to provide students with the necessary background information about soil mechanics. The course aims to: 1- Provide students with a fundamental understanding of the principle of soil mechanics, soils' properties, states, behavior, and mechanics. 2- Give students training on solving problems by applying the theories and principles in soil mechanics. 3- Solve problems based on phase relationships, and soil classification according to various international classification systems and determine the suitability of soils for engineering purposes. 4- Understand the principles of soil mechanics and it is application: Flow of water through the soil, permeability, seepage. The principle of effective stress and its implications. Consolidation and calculate elastic and consolidation settlements. 5- Understand the soil improvement and stabilization techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: 1. Understand and implement the basic fundamentals of soil behavior. 2. Ability to solve problems related to soil mechanics, especially stress distribution, soil stabilization, water flow, and soil settlement. 3. Use modern soil mechanics equipment and soil investigation procedures. 4. Gain the ability to how to write professional, clear, concise technical reports. 5. Being able to identify and manage field problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Part A-Introduction and physical properties Introduction, physical properties of soil, moisture content, density, void ratio, porosity and saturation, Atterberg limits and soil classification. [22 hrs]

	Revision problem classes [6 hrs] 2- Part B- Permeability and seepage Permeability, seepage flow net construction, seepage through and under dams, seepage forces, and piping. [22 hrs] Revision problem classes [6 hrs] 3- Part C- Soil Stresses The concept of total and effective stress and pore water pressure. [10 hrs] Revision problem classes [4 hrs] 4- Part D- Compressibility of the soil Consolidation of soils, measurement of the consolidation of cohesive soils in the laboratory, theoretical consideration of amount and rate of settlement. [15 hrs] Revision problem classes [6 hrs] 5- Part E- Soil stabilization Soil improvement and stabilization techniques. [10 hrs] Revision problem classes [4 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	A combination of theoretical classes and laboratory practical classes On completion of this course, the student will be able to: 1. Demonstrate ability to explain the multiphase nature of soils and to derive quantities relating to the volumes and masses of the different phases of a soil 2. Describe the ability to apply the effective stress concept to solve elementary geotechnical problems 3. Determine and classify soils. 4. Establish skills in soil permeability and compaction measurement and skills in the solution of seepage-related problems. 5. Developing the student's ability to make decisions in the field.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to soil engineering
Week 2	Physico–mechanical properties of soil
Week 3	Soil classification

Week 4	Soil classification
Week 5	Permeability & seepage flow in soils
Week 6	Permeability & seepage flow in soils
Week 7	Permeability & seepage flow in soils
Week 8	Permeability & seepage flow in soils
Week 9	Stresses within soil mass (Internals Stresses)
Week 10	Stresses within soil mass (External Stresses)
Week 11	Consolidation and Compressibility of the soil
Week 12	Consolidation and Compressibility of the soil
Week 13	Consolidation and Compressibility of the soil
Week 14	Soil Stabilization
Week 15	Soil Stabilization
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction, and Visiting the Lab.
Week 2	Water content estimation and physical properties of the soil.
Week 3	Specific gravity of the soil.
Week 4-5	Grain size distribution of the soil.
Week 6-7	Atterberg limits
Week 8	Chemical tests of the soil.
Week 9-10-11	Consolidation test explanation and training.
Week 12	Swelling test.
Week 13	Collapse test.
Week 14	Compaction test.
Week 15	Field density test.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. "Principles of Geotechnical Engineering",(2007), Braja M. Das, 5th edition 2002, copyright by Wadsworth Group/United Stated. 2. "Principal of Soil Mechanic", (1991), Mohammed O. AL-Asho, (Book language in Arabic).	Yes
Recommended Texts	1."Elements of Soil Mechanics", (1988), G. N. Smith and Ion G. N. Smith, USA. 2."Problem Solving in Soil Mechanics", (2003), A. Aysen, Swets & Zeitlinger B.V	No
Websites		No

Module Information معلومات المادة الدراسية					
Module Title	English III			**Module Delivery**	
Module Type	Support			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	U		**Semester of Delivery**	1	
Administering Department	DWRE	**College**	COE		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor		**e-mail**			

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	English III course - a perfectly-balanced syllabus with a strong grammar focus, and full support at all six levels. Headway's trusted methodology combines solid grammar and practice, vocabulary development, and integrated skills with communicative role-plays and personalization. Authentic material from a variety of sources enables students to see new language in context, and a range of comprehension tasks, language and vocabulary exercises, and extension activities practice the four skills. "Everyday English" and "Spoken grammar" sections practice real-world speaking skills, and a writing section for each unit at the back of the book provides models for students to analyze and imitate.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Here are five Course Learning Outcomes (CLOs) for the course "English Language Intermediate": CLO1: Demonstrate an advanced understanding of English grammar, including complex sentence structures, verb tenses, and grammatical rules, to effectively communicate ideas and convey precise meaning. CLO2: Develop strong listening skills to comprehend and extract the main ideas, details, and nuances from a variety of written and spoken texts, such as articles, interviews, presentations, and conversations.

	CLO3: Engage in meaningful and productive conversations using appropriate language, actively participating and expressing thoughts, opinions, and experiences with fluency, accuracy, and appropriate intonation and register. CLO4: Produce well-organized and coherent paragraphs, incorporating effective writing strategies such as introductions, topic sentences, supporting details, transitions, and conclusions, to create logical and cohesive written texts. CLO5: Expand vocabulary range and selection, including the ability to use appropriate vocabulary to discuss feelings, opinions, and experiences, and to recognize, understand, and use a variety of phrasal verbs and collocations in both spoken and written communication.
Indicative Contents المحتويات الإرشادية	Grammar: Review and expansion of intermediate-level grammar points such as verb tenses (present, past, future), conditionals, modals (Unit 1,2,3,4).

	Vocabulary: Building vocabulary related to various themes, including work, travel, health, technology, entertainment, and current affairs. This may involve learning new words, idiomatic expressions, collocations, and phrasal verbs. (Unit 1,2,3,4). Reading: Reading passages or texts of moderate difficulty to improve comprehension skills, expand vocabulary, and develop reading strategies. Topics could include articles, short stories, informational texts, and adapted authentic materials. (Unit 1,2,3,4). Writing: Developing writing skills by practicing different text types, such as emails, letters, reports, essays, reviews, and summaries. Focus may be placed on organizing ideas, using appropriate language, and improving grammatical accuracy. (Unit 1,2,3,4). Listening: Enhancing listening comprehension through a variety of audio materials, including dialogues, interviews, news reports, lectures, and conversations. Activities may involve multiple-choice questions, gap-filling exercises, and answering comprehension questions. (Unit 1,2,3,4). Speaking: Encouraging spoken communication through pair and group activities, discussions, role-plays, and presentations. Topics might include personal experiences, current events, opinions, and debates. . (Unit 1,2,3,4). Classroom presentation tool brings the Fourth edition Student's Book and Workbook alive on the classroom wall, complete with interactive exercises, audio and video. The built-in tools like focus, pens and highlighter give students a truly interactive teaching and learning experience. Student Book and Workbook audio for extra practice, plus Student Book video are now available on the Headway Student website.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit 1 – Part 1 A world of difference (Grammar, Vocabulary, and Everyday English)
Week 2	Unit 1 – Part 2 A world of difference (Grammar, Vocabulary, and Everyday English)
Week 3	Unit 2 – Part 1 The working week (Grammar, Vocabulary, and Everyday English)
Week 4	Unit 2 – Part 2 The working week (Grammar, Vocabulary, and Everyday English)
Week 5	Quiz 1 in Ch.1, and Ch.2
Week 6	Unit 3 – Part 1 Good times, Bad times (Grammar, Vocabulary, and Everyday English)
Week 7	Unit 3 – Part 2 Good times, Bad times (Grammar, Vocabulary, and Everyday English)
Week 8	Unit 4 – Part 1 Getting it right (Grammar, Vocabulary, and Everyday English)
Week 9	Unit 4 – Part 2 Getting it right (Grammar, Vocabulary, and Everyday English)
Week 10	Quiz 2 in Ch. 3, and Ch.4
Week 11	Presentation 1
Week 12	Presentation 2
Week 13	Review all chapters for Mid Exam
Week 14	Midterm Exam
Week 15	Review for Final Exam
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• New Headway Intermediate Fourth Edition Student's Book and iTutor Pack, View larger,Part of New Headway Fourth Edition, By: Liz Soars & John Soars, ISBN-10 ： 0194770257	No
Recommended Texts	N/A	N/A
Websites	https://elt.oup.com/catalogue/items/global/adult_courses/new_headway/intermediate_fourth_edition/?cc=global&selLanguage=en&mode=hub	

Module Information
معلومات المادة الدراسية

Module Title	**Open Channels**			**Module Delivery**
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U		**Semester of Delivery**	2
Administering Department	DWR	**College**		ENG
Module Leader	Dr. Mena Ahmed Alsawaf	**e-mail**		m.alsawaf@uomosul.edu.iq
Module Leader's Acad. Title	lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)	**e-mail**		E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	On successful completion of this course students will be able to: 6. Recognize the common physical phenomenon of flow in open channel 7. Classify the type of flow and the properties for each type, with the common empirical equations 8. Define the specific energy of the flow in open channel and connect that with practical cases that happen in reality 9. Route the curve of surface water profile when there is a structure in open channel 10. Recognize the main typed of pumps used in water resources engineering and how the connect each other and define the main requirements to design the right one
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Recognize types of open channel and the theoretical equation related to each. 13. Understand the flow variables affected to design an open channel. 14. Summarize the energy of flow and how move with flow. 15. Discuss the usage of closed channel and how to design, and compute the energy dissipated 16. Describe the phenomenon "hydraulic jump" and indicate its danger when care does not take to deal with it on a structure like dam 17. Define the critical depth, subcritical flow and super critical flow and indicate when and where they happen in reality 18. Identify the raise or decrease in water level due to change in channels and compute the effect of back water curve 19. Discuss the requirements and limitation to design a weir and its usage 20. Discuss types to compute discharge from a weir and correct the readings 21. Explain the time consumed to empty a reservoir by weir or notch.

	22. Identify the main view and characteristic of using a software related to open channel (HEC-RAS).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Analyzing the flow in open channel Defining the main variables affected on the flow of open channel and learn the right theoretical way to deal with each case, such as Manning equation and Chezy equation in trapezoidal channel or rectangular, classify the channel, learn the consideration of hydraulic radius and Manning coefficient, study hydraulic jump, energy dissipated. [20 hrs] Part B – Designing an Open Channel Design a channel with best hydraulic section, design a channel in different shapes, design a channel with critical flow, design a channel affected by back water curve, design a weir to empty a reservoir, correct its variables, design a structures to measure the discharge in an irregular open channel or natural. [48 hrs] Part C – Software Apply the principles of flow in open channel with different structures in case of steady or unsteady flow in an application relevant to channel (HEC-RAS). [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, class works and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Open channel, types and classifications.
Week 2	Uniform flow, Chezy and Manning equations.
Week 3	Best hydraulic cross section
Week 4	Consecration of hydraulic radius and Manning coefficient
Week 5	Specific energy and critical depth.
Week 6	Critical depth with humps or contractions
Week 7	Hydraulic jump
Week 8	Varied flow
Week 9	water surface profile
Week 10	Weirs and notches

Week 11	Empirical Formulae for Discharge Over Rectangular Weir
Week 12	Time Required to empty a Reservoir or a Tank with Rectangular and Triangular Weirs or Notches
Week 13	Measurement of Flow of Irregular Channels
Week 14	Software: HEC-RAS, steady flow in channels
Week 15	Software: HEC-RAS, unsteady flow in channels
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Vennard, J.K., 1963. Elementary fluid mechanics. 4th edition.	Yes
Recommended Texts	Rajput, R.K., 2004. *A textbook of fluid mechanics and hydraulic machines*. S. Chand Publishing.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering	

Module Information
معلومات المادة الدراسية

Module Title	Groundwater Hydrology		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	3U	**Semester of Delivery**	2
Administering Department	Dams and Water Resources	**College**	Engineering
Module Leader	Dr.Rasha M. Sami Fadhil	**e-mail**	Rasha.fadhil@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	Groundwater hydrology is essential for third-stage dams and water resources engineering students in order to • identify the properties of artesian wells and describe the conditions under which they form; • explain the difference between porosity and permeability; • list and describe the properties of aquifers that control the movement and storage of groundwater; • use Darcy's Law to explain the roles of aquifer properties and driving forces in governing the rate of groundwater flow; • apply the concept of hydraulic head to draw flowlines on maps and cross sections; • interpret the current and historical balance between groundwater recharge and water extraction from well hydrographs;
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Overview of essential concepts encountered in hydrological systems. • An ability to distinguish, identify, define , formulate and solve engineering problems by appling principles of engineering scince and mathmatics. • Learning role of groundwater flow modelling within hydrogeology and consequently water resources management

	• Learning the mathematical basis of groundwater flow models (Darcy's law, conservation of mass/energy) and solve issue associated with the treatment of wells • The key components of groundwater flow models and the typical workflow of groundwater flow modelling, with emphasis on application using software.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • General introduction - groundwater cycle. (4hrs) • Groundwater aquifers in Iraq . (4hrs) • Definitions and terms. (4hrs) • Groundwater movement laws. (6hrs) • The steady state of flow in wells. (4hrs) • Unsteady flow condition. (6hrs) • overlapping wells. (6hrs) • The imaginary well theory. (4hrs) • Pumping check. (4hrs) • Well drilling. (4hrs) • Flow network and groundwater mapping. (6hrs) • The relationship of rainfall with the groundwater level and data documentation. (4hrs)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The essential strategy of this module is to motivate students about applying theory of groundwater occurrence and movement; groundwater extraction, replenishment, and protection; knowing the underlying principles of methods applied to groundwater exploration and pumping tests; building numerical models for groundwater flow. Ability to use software for simulating Groundwater.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General introduction - What is Groundwater? Groundwater and the Water Cycle Groundwater aquifers in Iraq: Importance of Groundwater, Groundwater Scenario: Global Perspectives Global Mapper software.
Week 2	Definitions and terms: Aquifer Properties, Types of Aquifers, Confined aquifer Unconfined aquifer, Leaky aquifer, Perched Aquifers Properties of Aquifers, Porosity, Specific yield, Coefficient of permeability Global Mapper software.
Week 3	Groundwater movement laws: Darcy's Law, Hydraulic Conductivity, Transmissibility Excel Coding.
Week 4	The steady state of flow in wells: Analysis of Steady Groundwater Flow, Steady Flow in Confined Aquifers
Week 5	- Steady Flow in Unconfined Aquifers ,Steady Unconfined Flow without Recharge or Evapotranspiration Excel Coding
Week 6	Equations of Motion, Confined Groundwater Flow Confined Groundwater Flow between Two water Bodies, Unconfined Flow by Dupit's Assumption
Week 7	First monthly exam
Week8	Hydraulics of Wells, Drawdown in Wells, Steady Flow into a Well Confined Flow-Unconfined Excel Coding
Week 9	Flow- Functions of Wells, Classification of Water Wells, Open Wells-Tube wells
Week 10	The imaginary well theory. GMS software
Week 11	Pumping check. Well flow near aquifer boundaries-Well flow near an Impermeable boundaries -Multiple Well System- GMS software GMS software
Week 12	Flow network and groundwater mapping. GMS software
Week13	Well drilling- penetration speed, diameter of the bit, depth of the hole and level of vibration. GMS software
Week 14	The relationship of rainfall with the groundwater level and data documentation. GMS software
Week 15	**Second monthly exam .**
Week 16	**The preparatory week before the Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Groundwater hydrology (2005) by Todd,D.K., Mays, L. W. Wiley Ground	Yes
Recommended Texts	Groundwater hydrology-Conceptual and computational Models (2003)by K.R.Rushton published by Wiley	Yes
Websites	https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/ https://ocw.mit.edu/courses/1-72-groundwater-hydrology-fall-2005/pages/lecture-notes/	

Module Information
معلومات المادة الدراسية

Module Title	**Drainage Engineering**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	3U	**Semester of Delivery**	1
Administering Department	DWRE	**College**	COE
Module Leader	Dr. Ahmed A. M. Al-Ogaidi	**e-mail**	a.alogaidi@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	-----	**e-mail**	-----

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1. To introduce the students to the agricultural drainage required to enhance the field production, and to create a balance among water, air, and salts contents in the soil. 2. To learn general principles of groundwater hydraulics such as Darcy's law, Dupuit-Forchheimer method, and groundwater flow in layered soils. 3. To manage and reclaim the saline soils by leaching 4. To investigate drainage projects. 5. To evaluate soil hydraulic conductivity in field and in laboratory. 6. To understand different types of drainage systems and their planning. 7. To design the cross-section of surface and subsurface drains. 8. To choose the proper distance between drains. 9. To understand the vertical drainage. 10. To maintain drainage systems. 11. To understand the effect of drainage on environment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The Drainage Engineering course teaches students a lot of useful things in designing and understanding drainage networks. After completing this course, students are supposed to be familiar with the following points: 1. Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. 2. Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. 3. Learn about the reclamation of saline soils, salts removal, and the requirements for leaching them. 4. Learn the exploratory and design investigations of drainage projects. 5. Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. 6. Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. 7. Learn the basics of designing surface (open) and subsurface (covered) drainage sections. 8. Designing the distances between the drains in the case of stable and unstable flow. 9. Identifying the vertical drainage (drainage wells). 10. Learn drainage maintenance. 11. The relationship between drainage and environmental pollution.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following: General introduction on drainage of agricultural lands Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil. [5 hrs] Principles of groundwater hydraulics Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation. [10 hrs] Reclamation of saline soils The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements. [10 hrs] Drainage projects' investigations Exploratory investigations, design investigations, and groundwater investigations. [5 hrs] Estimation of soil hydraulic conductivity Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation. [10 hrs] Drainage systems Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes). [5 hrs] Design of drains' sections Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters. [5 hrs] Spacing between drains Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition. [15 hrs] Vertical drainage (drainage wells) Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells. [5 hrs] Drains' maintenance Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. Drainage and water pollution Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling. [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**General introduction on drainage of agricultural lands:** Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil.
Weeks 2-3	**Principles of groundwater hydraulics:** Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation.
Weeks 4-5	**Reclamation of saline soils:** The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements.
Week 6	**Drainage projects' investigations:** Exploratory investigations, design investigations, and groundwater investigations.
Weeks 7-8	**Estimation of soil hydraulic conductivity:** Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation.
Week 9	**Drainage systems:** Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes).
Week 10	**Design of drains' sections:** Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters.
Weeks 11-13	**Spacing between drains:** Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition.
Week 14	**Vertical drainage (drainage wells):** Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells.
Week 15	**Drains' maintenance:** Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. **Drainage and water pollution:** Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 5	Lab 1: Laboratory estimation of soil hydraulic conductivity
Week 13	Lab 2: Training on a software of computing drain spacing

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	هندسة البزل، د. عبد الستار يونس الدباغ، أنغام عز الدين علي (1992). Drainage Engineering, James N. Luthin (1973).	Yes
Recommended Texts	البزل، د. محسن محارب عواد اللامي، د. علاء صالح عبد الجبار الجنابي (1991). Irrigation and drainage engineering, Peter Waller, Muluneh Yitayew (2016).	No
Websites	http://ecoursesonline.iasri.res.in/course/view.php?id=550	

Module Information معلومات المادة الدراسية				
Module Title	**Soil Mechanics and Foundations**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	**3**	**Semester of Delivery**	**Six**	
Administering Department	Dam and water resources	**College**	Engineering	
Module Leader	Ibrahim M. Alkiki	**e-mail**	i.alkiki@uomosul.edu.iq	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ms.C	
Module Tutor	Dr. Zuheir Karabash	**e-mail**	Karabash@uomosul.edu.iq	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- The course aims to give students the knowledge to understand the theory of shear strength of the soil. 2- The issue of engineering soil problems and how to improve the soil to raise its bearing capacity, reduce subsidence, and avoid the problems of swelling and fallout, and the effects of gypsum and saline soils will also be discussed. 3- to understand the concept of lateral earth pressures of soils and retaining wall. 4-To develop problem-solving skills and understanding of foundation engineering theory through the application of techniques. To provide students with exposure to systematic methods for designing foundations. 5-To discuss and evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior. 6- To understand the structural design of different types of shallow foundations. 7-To Calculate the ultimate pile capacity in the sand and in clay. To calculate the ultimate pile capacity of group piles and assess pile group efficiency. To estimate settlement of single and group piles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the shear strength behavior of the soil and find the shear parameters which are important in the calculation of the bearing capacity of the soil. 2. Calculate the lateral earth pressure and the lateral force that is applied on the retaining walls which is essential for designing the retaining walls and for the factor of safety against failure. 3. Use modern soil mechanics equipment and soil investigation procedures. 4.Gain the ability to how to write professional, clear, concise technical reports. 5. Design different types of shallow foundations structurally. Calculate the bearing capacity of shallow foundations erected on clays and sands. Calculate bearing capacity of

	shallow foundations subjected to moment 6. Understand the structural design of foundations. 7. Calculate the ultimate pile capacity in the sand. Calculate ultimate pile capacity in soils. Calculate single and group pile settlements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - <u>Part A- Soil investigation</u> Introduction to the foundation engineering, and soil investigation methods and preparation of the investigation reports.[10] Revision problem classes [2 hrs] - <u>Part B -Shear strength of the soil</u> Shear strength theory, parameters of the shear strength, failure mechanism, plane of failure, stresses on the planes in soil, Mohr's circle and Mohr's envelope of failure, laboratory and field shear strength tests.[12] Revision problem classes [6 hrs] <u>- Part C – Bearing capacity of shallow foundations</u> Type of foundations, bearing capacity equations (Terzaghi equation, Hansen equation, Meyerhof equation, Vesic equation), bearing capacity of foundation on sand, bearing capacity of foundation on clay, bearing capacity of foundation subjected to moment. [12 hrs] Revision problem classes with problem-solution discussions [6 hrs] <u>- Part D – Design of earth retaining structures</u> - Estimation the lateral earth pressure, Design of gravity retaining walls, design of cantilevered retaining walls, overturning stability, sliding stability, bearing capacity of retaining walls [12 hrs] Design problem-solution discussions [6 hrs] <u>- Part E – Deep foundation: Ultimate pile capacity</u> Type of deep foundations, ultimate pile capacity in sand, ultimate pile capacity in clay, pile capacity of group piles, group pile efficiently [10 hrs] Revision problem classes with problem-solution discussions [2 hrs] <u>-Part F – Structural design of shallow foundations</u> Types of foundations, structural design of spread footing, structural design of continuous footing, structural design of combined footing, structural design of trapezoidal and strap footings, structural design of raft foundations. [10 hrs] - Design problems [2 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and general information.
Week 2	Soil investigation and description.
Week 3	Shear strength of the soil.
Week 4	Shear strength of the soil.
Week 5	Shear strength of the soil.
Week 6	Bearing capacity of the soil.
Week 7	Bearing capacity of the soil.
Week 8	Bearing capacity of the soil.
Week 9	Lateral earth pressure of the soil.
Week 10	Lateral earth pressure of the soil.
Week 11	Retaining walls.
Week 12	Deep foundation.
Week 13	Deep foundation.
Week 14	Foundation structural design.
Week 15	Foundation structural design.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to laboratory
Week 2	Unconfined compression test
Week 3-4	Direct shear test- explain and training
Week 5-6-7	Triaxial shear test- explain and training
Week 8-9	Vane shear test.
Week 10-11	Standard penetration test.
Week 12-13	Cone penetration test.
Week 14-15	Plate load bearing test.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	3. "Principles of Geotechnical Engineering",(2004), Braja M. Das, 5th edition 2002, copyright by Wadsworth Group/United Stated. 4. "Principal of Soil Mechanic", (1991), Mohammed O. AL-Asho, (Book language in Arabic). 4- الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ،الطبعة الاولى، 1985.	Yes
Recommended Texts	3." Elements of Soil Mechanics", (1988), G. N. Smith and Ion G. N. Smith, USA. 4." Problem Solving in Soil Mechanics", (2003), A. Aysen, Swets & Zeitlinger B.V. , ″Foundation Analyses and Design ″3. Bowles, J.E., P.E., S.E., *2006*.The McGraw-Hill Companies, Inc, 5th ed., Foundation ″4. -Peak, R. B., Hanson, W. E. and Thorburn, T.H., , John Wiley and Sons, 2nd ed., 1974 ″Engineering , Thomson ″Principle of Foundation Engineering ″5. Das, B. M., Books/Cole, California State University, Sacramento, 5th ed., 2004. Principles of foundation ″ 6. Das, B. M., & Sivakugan, N., , Cengage learning, 2018. ″engineering	No
Websites		No

Module Information معلومات المادة الدراسية					
Module Title	**Soil Mechanics and Foundations**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	**3**		**Semester of Delivery**	**Six**	
Administering Department	Dam and water resources	**College**	Engineering		
Module Leader	Ibrahim M. Alkiki	**e-mail**	i.alkiki@uomosul.edu.iq		
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ms.C		
Module Tutor	Dr. Zuheir Karabash	**e-mail**	Karabash@uomosul.edu.iq		

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- The course aims to give students the knowledge to understand the theory of shear strength of the soil. 2- The issue of engineering soil problems and how to improve the soil to raise its bearing capacity, reduce subsidence, and avoid the problems of swelling and fallout, and the effects of gypsum and saline soils will also be discussed. 3- to understand the concept of lateral earth pressures of soils and retaining wall. 4-To develop problem-solving skills and understanding of foundation engineering theory through the application of techniques. To provide students with exposure to systematic methods for designing foundations. 5-To discuss and evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behavior. 6- To understand the structural design of different types of shallow foundations. 7-To Calculate the ultimate pile capacity in the sand and in clay. To calculate the ultimate pile capacity of group piles and assess pile group efficiency. To estimate settlement of single and group piles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the shear strength behavior of the soil and find the shear parameters which are important in the calculation of the bearing capacity of the soil. 2. Calculate the lateral earth pressure and the lateral force that is applied on the retaining walls which is essential for designing the retaining walls and for the factor of safety against failure. 3. Use modern soil mechanics equipment and soil investigation procedures. 4.Gain the ability to how to write professional, clear, concise technical reports. 5. Design different types of shallow foundations structurally. Calculate the bearing capacity of shallow foundations erected on clays and sands. Calculate bearing capacity of

	shallow foundations subjected to moment 6. Understand the structural design of foundations. 7. Calculate the ultimate pile capacity in the sand. Calculate ultimate pile capacity in soils. Calculate single and group pile settlements.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Part A- Soil investigation Introduction to the foundation engineering, and soil investigation methods and preparation of the investigation reports.[10] Revision problem classes [2 hrs] - Part B -Shear strength of the soil Shear strength theory, parameters of the shear strength, failure mechanism, plane of failure, stresses on the planes in soil, Mohr's circle and Mohr's envelope of failure, laboratory and field shear strength tests.[12] Revision problem classes [6 hrs] - Part C – Bearing capacity of shallow foundations Type of foundations, bearing capacity equations (Terzaghi equation, Hansen equation, Meyerhof equation, Vesic equation), bearing capacity of foundation on sand, bearing capacity of foundation on clay, bearing capacity of foundation subjected to moment. [12 hrs] Revision problem classes with problem-solution discussions [6 hrs] - Part D – Design of earth retaining structures - Estimation the lateral earth pressure, Design of gravity retaining walls, design of cantilevered retaining walls, overturning stability, sliding stability, bearing capacity of retaining walls [12 hrs] Design problem-solution discussions [6 hrs] - Part E – Deep foundation: Ultimate pile capacity Type of deep foundations, ultimate pile capacity in sand, ultimate pile capacity in clay, pile capacity of group piles, group pile efficiently [10 hrs] Revision problem classes with problem-solution discussions [2 hrs] -Part F – Structural design of shallow foundations Types of foundations, structural design of spread footing, structural design of continuous footing, structural design of combined footing, structural design of trapezoidal and strap footings, structural design of raft foundations. [10 hrs] - Design problems [2 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and general information.
Week 2	Soil investigation and description.
Week 3	Shear strength of the soil.
Week 4	Shear strength of the soil.
Week 5	Shear strength of the soil.
Week 6	Bearing capacity of the soil.
Week 7	Bearing capacity of the soil.
Week 8	Bearing capacity of the soil.
Week 9	Lateral earth pressure of the soil.
Week 10	Lateral earth pressure of the soil.
Week 11	Retaining walls.
Week 12	Deep foundation.
Week 13	Deep foundation.
Week 14	Foundation structural design.
Week 15	Foundation structural design.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to laboratory
Week 2	Unconfined compression test
Week 3-4	Direct shear test- explain and training
Week 5-6-7	Triaxial shear test- explain and training
Week 8-9	Vane shear test.
Week 10-11	Standard penetration test.
Week 12-13	Cone penetration test.
Week 14-15	Plate load bearing test.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	5. "Principles of Geotechnical Engineering",(2004), Braja M. Das, 5th edition 2002, copyright by Wadsworth Group/United Stated. 6. "Principal of Soil Mechanic", (1991), Mohammed O. AL-Asho, (Book language in Arabic). 4- الشكرجي ، يوسف والمحمدي، نوري، " هندسة الأسس " ، جامعة بغداد ،الطبعة الاولى، 1985.	Yes
Recommended Texts	5." Elements of Soil Mechanics", (1988), G. N. Smith and Ion G. N. Smith, USA. 6." Problem Solving in Soil Mechanics", (2003), A. Aysen, Swets & Zeitlinger B.V. , ″Foundation Analyses and Design ″3. Bowles, J.E., P.E., S.E., *2006*.The McGraw-Hill Companies, Inc, 5th ed., Foundation ″4. -Peak, R. B., Hanson, W. E. and Thorburn, T.H., , John Wiley and Sons, 2nd ed., 1974 ″Engineering , Thomson ″Principle of Foundation Engineering ″5. Das, B. M., Books/Cole, California State University, Sacramento, 5th ed., 2004. Principles of foundation ″ 6. Das, B. M., & Sivakugan, N., , Cengage learning, 2018. ″engineering	No
Websites		No

Module Information
معلومات المادة الدراسية

Module Title	**Consumptive use and water duty**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Level	3	**Semester of Delivery**	2
Administering Department	Dam and water resources	**College**	Engineering
Module Leader	Dr.Anmar Abdulaziz Majeed Al-Talib	**e-mail**	Anmar.altalib@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Ass.Lec.Alaa Ismaeel Naser	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1.To understand Consumptive use and water duty. and other methods. 2. To understand Penman monteth equation 3. To understand the Irrigation efficiencies. 4.To understand the Irrigation frequency and amount of water. 5. To understand the Irrigation methods . 6. To understand the Principles of Irrigation networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Eto) of (of the potential Consumptive use 1. how to use mathematical relations in a calculation different crops . Identify the different stages of crop growth . 2. Draw the crop coefficient curve for different crops . 3. Calculating the water Consumptive use of the crop . 4. Identify the different irrigation efficiencies within the field . 5. Calculation of water duty for irrigation projects . 6. Learn about different irrigation methods and their specifications . 7. 12.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Consumptive use Absolute water consumption - transpiration - evaporation - conditions affecting water consumption - direct measurements of water consumption - Hargreves equation - water consumption of natural plants, Calculation of water consumption reference ETo for crops using the Benman Monteth equation [5 hrs]

	Find crop coefficient Kc for different plants and calculate water Consumptive use of crop ETc, - Meteorology as a guide for water Consumptive use - Plani - Creedli method - Jensen - Hayes method Climate and plant physiology (functions of plant members) and their relevance to water Consumptive use [5 hrs] Plant growth season - Water Consumptive use needs for crops during the growing season - Practical considerations. [2 hrs] When to irrigate - and how much water to apply, the soil moisture endpoints, the external appearance of the crop, Use of various crops for water, available water resources, winter irrigation, Autumn irrigation. [5 hrs] Revision problem classes [2 hrs] Part B – water duty Fundamentals The effect of the sedimentary soil layer, the stage of plant growth and its effect on the irrigation method, irrigation during the vegetative growth stage, the method of flowering irrigation. [6 hrs] The method of irrigation during the fruiting period, depth of the root area, irrigation frequency (irrigation rotation), irrigation efficiency, water transfer efficiency, water application efficiency , water use efficiency, water storage efficiency. [6 hrs] Drip irrigation, the benefits of drip irrigation, potential problems of drip irrigation, Surface irrigation and underground irrigation (under surface) ,Free flooding without control, submerged slides, submerged docks, internal irrigation, hydraulic surface irrigation. [6 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Through this semester we will try to teach the student how to calculate the value of the reference water Consumptive use of the plant and then learn how to draw the crop coefficient curve and thus how to calculate the water Consumptive use of the crop using more than one method in the calculations and compare them and choose the best according to the weather data available to us and then the student will be able to choose Crops suitable for cultivation, defining the agricultural plan in the field or project, and calculating the water standard that will enable the student to determine the seasonal amount of water needed for the field or project. The student will also learn how to calculate the different irrigation efficiencies for the purpose of choosing the appropriate irrigation method for the field, which will be determined by the topography and the physical properties of the soil.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Absolute water consumption - transpiration - evaporation - conditions affecting water consumption - direct measurements of water consumption - Hargreves equation - water consumption of natural plants
Week 2	Calculation of water consumption reference ETo for crops using the Bennett Monteth equation
Week 3	Find crop coefficient Kc for different plants and calculate water consumption of crop ETc
Week 4	- Meteorology as a guide for water consumption - Plani - Creedli method - Jensen - Hayes method Climate and plant physiology (functions of plant members) and their relevance to water consumption
Week 5	Plant growth season - Water consumption needs for crops during the growing season - Practical considerations
Week 6	When to irrigate - and how much water to apply, the soil moisture endpoints, the external appearance of the crop
Week 7	Use of various crops for water, available water resources, winter irrigation, Autumn irrigation
Week 8	Soil moisture removal by plant roots, moisture content effect on soil dehumidification rate
Week 9	The effect of the sedimentary soil layer, the stage of plant growth and its effect on the irrigation method, irrigation during the vegetative growth stage, the method of flowering irrigation
Week 10	The method of irrigation during the fruiting period, depth of the root area, irrigation frequency (irrigation rotation)
Week 11	irrigation efficiency, water transfer efficiency, water application efficiency , water use efficiency, water storage efficiency
Week 12	Efficiency of water distribution, efficiency of water consumption, Examples of irrigation efficiencies
Week 13	sprinkler irrigation, other uses of sprinkler networks, basic conditions for sprinkler irrigation system design, sprinkler network design
Week 14	Drip irrigation, the benefits of drip irrigation, potential problems of drip irrigation
Week 15	Surface irrigation and underground irrigation (under surface) Free flooding without control, submerged slides, submerged docks, internal irrigation, hydraulic surface irrigation,
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Irrigation principles and practices , by V.E. Hansen ,O.W.Israelsen and G.F. Stringham, fourth edition, john wiley and sons., 1980.	Yes

Module Information معلومات المادة الدراسية					
Module Title	**Drainage Engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DWRE 324**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		3	**Semester of Delivery**		1
Administering Department		DWRE	**College**	COE	
Module Leader	Dr. Ahmed A. M. Al-Ogaidi		**e-mail**	a.alogaidi@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	-----		**e-mail**	-----	
Peer Reviewer Name		Dr. Anmar Altalib	**e-mail**	anmar.altalib@uomosul.edu.iq	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To introduce the students to the agricultural drainage required to enhance the field production, and to create a balance among water, air, and salts contents in the soil. 2. To learn general principles of groundwater hydraulics such as Darcy's law, Dupuit-Forchheimer method, and groundwater flow in layered soils. 3. To manage and reclaim the saline soils by leaching 4. To investigate drainage projects. 5. To evaluate soil hydraulic conductivity in field and in laboratory. 6. To understand different types of drainage systems and their planning. 7. To design the cross-section of surface and subsurface drains. 8. To choose the proper distance between drains. 9. To understand the vertical drainage. 10. To maintain drainage systems. 11. To understand the effect of drainage on environment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The Drainage Engineering course teaches students a lot of useful things in designing and understanding drainage networks. After completing this course, students are supposed to be familiar with the following points: 1. Definition of drainage, its purpose, evidence and benefits, as well as an overview of the history of drainage in Iraq. 2. Learn the basics of groundwater movement by studying Darcy's law, Laplace's equation, and Dupuis-Forchheimer's equation. 3. Learn about the reclamation of saline soils, salts removal, and the requirements for leaching them. 4. Learn the exploratory and design investigations of drainage projects. 5. Studying the various methods used to estimate the hydraulic conductivity of soils in the laboratory and field. 6. Identifying the different drainage systems through their types, planning their locations and depths, and designing filters. 7. Learn the basics of designing surface (open) and subsurface (covered) drainage sections. 8. Designing the distances between the drains in the case of stable and unstable flow. 9. Identifying the vertical drainage (drainage wells). 10. Learn drainage maintenance. 11. The relationship between drainage and environmental pollution.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: <u>General introduction on drainage of agricultural lands</u> Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil. [5 hrs] <u>Principles of groundwater hydraulics</u> Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation. [10 hrs] <u>Reclamation of saline soils</u> The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements. [10 hrs] <u>Drainage projects' investigations</u> Exploratory investigations, design investigations, and groundwater investigations. [5 hrs] <u>Estimation of soil hydraulic conductivity</u> Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation. [10 hrs] <u>Drainage systems</u> Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes). [5 hrs] <u>Design of drains' sections</u>

	Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters. [5 hrs] Spacing between drains Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition. [15 hrs] Vertical drainage (drainage wells) Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells. [5 hrs] Drains' maintenance Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. Drainage and water pollution Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling. [5 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some challenging problems to motivate students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**General introduction on drainage of agricultural lands:** Definition of drainage, purpose of drainage, evidences of drainage problems, drainage benefits, drainage in Iraq, and sources of excess water in soil.
Weeks 2-3	**Principles of groundwater hydraulics:** Introduction, Law of energy conservation, groundwater potential, Darcy's law, Law of mass conservation, Laplace's equation, and Dupuit-Forchheimer equation.
Weeks 4-5	**Reclamation of saline soils:** The origin and nature of saline soils, Factors helping to increase the concentration of salts in agricultural soils, distribution and movement of salts in soil, the critical depth of groundwater, classification of saline soils, reclamation methods of saline soils, and soil leaching and leaching requirements.
Week 6	**Drainage projects' investigations:** Exploratory investigations, design investigations, and groundwater investigations.
Weeks 7-8	**Estimation of soil hydraulic conductivity:** Introduction, laboratory methods of soil hydraulic conductivity estimation, and field methods of soil hydraulic conductivity estimation.
Week 9	**Drainage systems:** Introduction, types of drainage networks, planning drains' positions, patterns of drainage network distribution, drain depths, accompanying works to subsurface drainage network, and filters (envelopes).
Week 10	**Design of drains' sections:** Introduction, drainage coefficient, design of open drains' sections, and design of pipe drains diameters.
Weeks 11-13	**Spacing between drains:** Introduction, equations used in specifying drains' spacing, equations based on steady-state flow condition, and equations based on unsteady-state flow condition.
Week 14	**Vertical drainage (drainage wells):** Introduction, types of drainage wells, advantages of vertical drainage, disadvantages of vertical drainage, groundwater flow towards drainage walls, and overlapping among drainage wells.
Week 15	**Drains' maintenance:** Introduction, maintenance of open drains, maintenance of buried drains, and maintenance of drainage wells. **Drainage and water pollution:** Introduction, effect of return water on domestic water uses, effect of return water on industrial water uses, effect of return water on fish water life, effect of return water on entertainment water uses, and methods of return water controlling.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 5	Lab 1: Laboratory estimation of soil hydraulic conductivity
Week 13	Lab 2: Training on a software of computing drain spacing

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	هندسة البزل، د. عبد الستار يونس الدباغ، أنغام عز الدين علي (1992). Drainage Engineering, James N. Luthin (1973).	Yes
Recommended Texts	البزل، د. محسن محارب عواد اللامي، د. علاء صالح عبد الجبار الجنابي (1991). Irrigation and drainage engineering, Peter Waller, Muluneh Yitayew (2016).	No
Websites	http://ecoursesonline.iasri.res.in/course/view.php?id=550	

المرحلة الرابعة / سنوي

مخطط مهارات المنهج																					
يرجى وضع اشارة في المربعات المقابلة لمخرجات التعلم الفردية من البرنامج الخاضعة للتقييم																					
				مخرجات التعلم المطلوبة من البرنامج																	
السنة / المستوى	رمز المقرر	اسم المقرر	أساسي أم اختياري	الاهداف المعرفية						الاهداف المهاراتية الخاصة بالبرنامج				الاهداف الوجدانية والقيمية				المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي)			
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4	د1	د2	د3	د4
المرحلة الرابعة / سنوي	DWR 401	تصميم المنشآت الهيدروليكية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 402	تصاميم وتقييم منظومات الري الحقلي	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 403	تصميم شبكات الري والبزل	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 404	التخمين والمواصفات	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 405	إدارة هندسية	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 406	هندسة السدود	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 407	هندسة الاسس	اجباري	√	√	√	√	√	√	√	√					√	√	√	√
	DWR 408	المشروع الهندسي	اجباري	√	√	√	√	√	√	√	√					√	√	√	√

المقررات الدراسية لقسم هندسة السدود والموارد المائية / كلية الهندسة / جامعة الموصل

المستوى الرابع

الرمز	الموضوع	الفصل الأول			الفصل الثاني			عدد الوحدات
		نظري	عملي	تطبيقي	نظري	عملي	تطبيقي	
هسمم 401	تصميم المنشات الهيدروليكية	2	2	1	2	2	1	6
هسمم 402	تصاميم وتقييم منظومات الري الحقلي	2	2	1	2	2	1	6
هسمم 403	تصاميم شبكات الري والبزل	1	2		1	2		4
هسمم 404	تخمين ومواصفات	1	2		1	2		4
هسمم 405	ادارة واقتصاديات الموارد المائية	2		2	2		2	4
هسمم 406	هندسة السدود	2		2	2		2	4
هسمم 407	هندسة الأسس	2			2			4
هسمم 408	المشروع الهندسي		4			4		4
المجموع		12	12	6	12	12	6	36
عدد الساعات الأسبوعية		30			30			

Module Information معلومات المادة الدراسية					
Module Title	**Design of Hydraulic Structures**			**First Semester**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	U(		**Semester of Delivery**	1	
Administering Department	DWRE	**College**	COE		
Module Leader	Nashwan Kamal Aldeen Mohammed	**e-mail**	nashwan.alomari@uomosul.edu.iq		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.		

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand and classify the hydraulic structures and their uses. 2. To understand the behavior of water seepage under hydraulic structures and develop the ability to compute the creep line and uplift pressure using different methods. 3. To perform the design steps of some types of stilling basin structures. 4. To understand the water diversion works and perform the head and cross regulator design steps.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Classify the hydraulic structures and their uses, 2. Recognize problems accompanying water seepage under the hydraulic structures, 3. Apply the basic concepts of engineering to calculate seepage and uplift pressure under different hydraulic structures, 4. Develop and solve design problems and analyze the data to evaluate the feasibility of components of some types of stilling basin and head and cross regulator, 5. Evaluate and analyze the safety of the head and cross regulator, 6. Demonstrate the ability to lead and productively participate in group situations by assigning multidisciplinary design projects for some hydraulic structures.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction of the hydraulic structures. • Some theories for estimating the uplift pressure and piping phenomena in hydraulic structures - Bligh's theory,

	- Lane's theory, - Khosla's theory, and - Flow net analysis. [25 hrs] • Protection works of approaches for the horizontal floor. [5 hrs] • Introduction of a hydraulic jump, its types, efficiency, length, position, and tailwater conditions. [5 hrs] • Stilling basins. - Introduction - Design of R.S.Varshney stilling basin - Design of SAF stilling basin, and - U.S.B.R II stilling basin. [15 hrs] • Cross regulator and head regulator. - Introduction and design steps of the cross regulator and head regulator. - Design example - Apply example [25 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures. Powerpoint presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Subject topics- Introduction of types of hydraulic structures
Week 2	Uplift pressure – Bligh theory – applied example
Week 3	Lane theory– applied example – Flow net analysis
Week 4	Khosla's theory – exit gradient.
Week 5	Applied example using Khosla's theory
Week 6	Protection works of approaches for horizontal floor
Week 7	Mid-term Exam + Hydraulic jump- types of tailwater condition and drawing of hydraulic jump
Week 8	Stilling basins - R.S.Varshney stilling basin - applied example
Week 9	SAF stilling basin - applied example
Week 10	U.S.B.R II stilling basin - applied example
Week 11	Introduction and design steps of the cross regulator and head regulator
Week 12	Design and apply the example of the cross and head regulator
Week 13	Continue a design and apply the example of the cross and head regulator
Week 14	Continue a design and apply the example of the cross and head regulator
Week 15	Continue a design and apply the example of the cross and head regulator + General Revision
Week 16	**A preparatory week before the Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) "*Theory & design of irrigation structures*". Nem Chand & Bros; Roorkee, India.	Yes
Recommended Texts	1. Asawa, G. L. (2008) "*Irrigation and Water Resources Engineering*" New Age International(P) Limited, Publishers. 2. Chanson, Hubert., (2004) "*The Hydraulics of Open Channel Flow: An Introduction*" Elsevier. 3. Chow, Ven te., (1959) "*Open Channels Hydraulics*" Mc Graw Hill.	No

Module Information
معلومات المادة الدراسية

Module Title	Design of Gravity Irrigation Systems		**First Semester**
Module Type	Core		☐ Theory ☒ Lecture ☐ Lab ☒ Tutorial ☒ Practical ☐ Seminar
Module Level	U	**Semester of Delivery**	1
Administering Department	Dam and Water Resources Engineering	**College**	College of Engineering
Module Leader	Dr. Zeyad Ayoob Sulaiman	**e-mail**	z.alsinjari@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Dr. Anmar Al Talib	**e-mail**	anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims
أهداف المادة الدراسية

The aims of the Design of Gravity (Surface) Irrigation Systems module are focused on providing learners with a comprehensive understanding of the principles, techniques, and considerations involved in designing effective and efficient gravity-based surface irrigation systems. The module aims to achieve the following objectives:

- Understanding Irrigation Design Principles: The module aims to familiarize learners with the fundamental principles of gravity irrigation design. This includes concepts such as water requirements, soil properties, crop water needs, and environmental factors that influence irrigation system design.
- Surface Irrigation Methods: The module aims to provide learners with an understanding of different surface irrigation methods, such as furrow irrigation, border irrigation, and basin irrigation. Learners will gain insights into the characteristics, advantages, and limitations of each method.
- Soil-Water Relationships: The module aims to enhance learners' understanding of the interaction between water and soil in surface irrigation systems. This includes topics such as infiltration, percolation, water distribution, and the impact of soil properties on water movement.
- Field Layout and Design Considerations: The module focuses on the design considerations and techniques for laying out irrigation fields, including factors such as field topography, soil conditions, land availability, local regulations, and

	budgetary limitations. Learners will learn to analyze and integrate these factors into their design decisions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who successfully complete this course have: 1. Learned characteristics of various methods of surface irrigation systems, (i) 2. Understood economics of irrigation, (i) 3. Able to design various types of gravity irrigation systems after collecting the required design data and analyzing these data in a way that suits the design of the surface irrigation system design, (i) and (ii) 4. Able to select a suitable irrigation system for a given situation, (ii) 5. Able to select the most economic irrigation design alternative, (vi)
Indicative Contents المحتويات الإرشادية	This course provides a comprehensive overview of various types of irrigation systems in term of description and design. This course is one of the essential courses for students of the Department of Dams and Water Resources Engineering, through which students are identified and trained in collecting basic data required to design surface irrigation systems using the most effective design procedure. The course includes the following topics: • Introduction to the farm irrigation and the basics of system design/ Basic design Factors/Consumptive use /Soil /Irrigation interval and water application depth. (15hr) • Efficiency ,adequacy ,and uniformity of irrigation, Water infiltration into soil. (20hr) • Land grading/description ,criteria ,and preparatory steps, Design of land grading/Slopes and field levels, Earthwork balance and earthwork calculations • Surface irrigation/Mechanism of surface irrigation process/Infiltration opportunity time and application depth, Water balance concept in surface irrigation. (20hr) • Border irrigation system/Assumptions ,considerations ,and limitations of design/Miscellaneous notes, Design flow rate/Flow depth/Maximum border length/Border width. (15hr) • Furrow irrigation/Furrow intake characteristics, Considerations, assumptions, limitations, and design equations, Runoff control techniques/Cutback irrigation, Runoff recovery system. (20hr) • Basin irrigation/ Considerations, assumptions, limitations, and design equations/Booher method. (15hr)
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When designing the module for the Design of Gravity Irrigation Systems, several strategies can be employed to enhance learning outcomes and engagement. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of real-world design projects. By implementing these strategies, the Design of Gravity Irrigation Systems module can create an engaging and effective learning experience that prepares learners with the knowledge and skills needed for designing efficient and sustainable irrigation systems.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to the farm irrigation and the basics of system design**
Week 2	**Basic design Factors/Consumptive use/Soil/Irrigation interval and water application depth**
Week 3	**Efficiency ,adequacy ,and uniformity of irrigation**
Week 4	**Water infiltration into soil**
Week 5	**Land grading/Description ,criteria ,and preparatory steps/ Design of land grading/Slopes and field levels**
Week 6	**Earthwork balance and earthwork calculations**
Week 7	**Applications on calculation of design slopes by different methods, Applications on calculation of design levels and earthwork**
Week 8	**Surface irrigation/Mechanism of surface irrigation process/Infiltration opportunity time and application depth**
Week 9	**Water balance concept in surface irrigation**
Week 10	**Border irrigation system/Assumptions ,considerations ,and limitations of design/Miscellaneous notes**
Week 11	**Design flow rate/Flow depth/Maximum border length/Border width**
Week 12	**applications on design of border irrigation system**
Week 13	**Furrow irrigation/Furrow intake characteristics/ Considerations, assumptions, limitations, and design equations**
Week 14	**Runoff control techniques/Cutback irrigation, Runoff recovery system**
Week 15	**Basin irrigation/ Considerations, assumptions, limitations, and design equations/Booher method**
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- Mosul University,1992.	Yes
Recommended Texts	Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.	Yes
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Dams Engineering**		**First Semester**
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	UGx11 4	**Semester of Delivery**	1
Administering Department	DWRE	**College**	Collage of Engineering
Module Leader	Dr. Yousif Hashim Abdullah Al-Aqeeli	**e-mail**	y.alaqeeli@uomosul.edu.iq
Module Leader's Acad. Title	Assist Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Ali Ahmad Abdulmawjood	**e-mail**	aliabdulmawjood@uomosul.edu.iq
Peer Reviewer Name	Dr. Anmar Abdul Al-aziz Al-Talib	**e-mail**	anmar.altalib@uomosul.edu.iq
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	19. An ability to specify the storage zones of a reservoir. (i) 20. An ability to estimate the reservoir storage capacity. (i) 21. An ability to estimate the probable life of the reservoir. (i) 22. An ability to specify the type of dam according to the conditions of valley. (i) 23. Formulate a preliminary design of an earth dam base on the chosen type. (ii) 24. An ability to specify the valley problems that considered during constructing an earth dam and ability to find solutions for these problems. (i), (ii) 25. An ability to identify the solutions for the problems that may be appear in an earth dam during operation of reservoir. (iii)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Specify the storage zones of a reservoir. 12. Draw the storage-surface area-elevation curve for a reservoir. 13. Estimate the reservoir storage capacity. 14. Estimate the live storage. 15. Estimate the dead storage. 16. Estimate the Flood storage. 17. Estimate the probable life of the reservoir. 18. Rout the outflow hydrograph if the inflow hydrograph was known using level pool routing. 19. Estimate the economical height of a dam.

	20. Estimate the types of earth dams. 21. Learn the modes of failure in earth dams. 22. Design of the Earth Dams. 23. Control the seepage through the body of the earth dam and its foundation. 24. Estimate the stability of slopes in an earth dam.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Dams Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoir Site Selection, Storage Zones of a Reservoir, Storage-Surface Area-Elevation, Volume of Storage Calculation Method. [4 hrs] Reservoir Storage Capacity Estimation, Live Storage Mass Curve Method, Tabulation Method, Hydrograph method, Sequent Peaks Analysis, Optimization Analysis. [8 hrs] Reservoir Sedimentation, Factors Effecting Sedimentation of Reservoir, Suspended Load Calculation {Discharge- Sediment Load Relationship, The probable life of the reservoir. [4 hrs] Flood Routing, Level Pool Routing. [8 hrs] Reservoir Flood Storage Capacity Estimation, Economical Height of a Dam, Classification of dams, Factors governing the selection of a particular type of dam [8 hrs] Earth and Rock fill Dams (Rolled fill dam), Earth and Rock fill Dams (Foundation for earth dams, Suit available materials), Earth and Rock fill Dams (Modes of failure in earth dams) [8 hrs] Earth and Rock fill Dams (Seepage through the body of the dam), Earth and Rock fill Dams (Design Consideration of an Earth Dams). [4 hrs] Earth and Rock Fill Dams (SEEPAGE CONTROL A-Seepage Control through the body of the Dam), Earth and Rock fill Dams (SEEPAGE CONTROL B- Seepage Control Through the Foundation). [8 hrs] Earth and Rock fill Dams (Location of a phreatic line), Earth and Rock fill Dams (Stability of Slopes), Earth and Rock fill Dams (Pore Water Pressure). [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Dams Engineering, Storage Works, Hydrological Aspects, Geological Investigations, Reservoir Site Selection, Storage Zones of a Reservoir, Storage-Surface Area-Elevation, Volume of Storage Calculation Method.
Week 2	Reservoir Storage Capacity Estimation, Live Storage Mass Curve Method, Tabulation Method,
Week 3	Hydrograph method, Sequent Peaks Analysis, Optimization Analysis
Week 4	Reservoir Sedimentation, Factors Effecting Sedimentation of Reservoir, Suspended Load Calculation {Discharge- Sediment Load Relationship, The probable life of the reservoir
Week 5	Flood Routing, Level Pool Routing
Week 6	Midterm Exam
Week 7	Reservoir Flood Storage Capacity Estimation, Economical Height of a Dam, Classification of dams
Week 8	Factors governing the selection of a particular type of dam
Week 9	Earth and Rock fill Dams (Rolled fill dam), Earth and Rock fill Dams (Foundation for earth dams, Suit available materials)
Week 10	Earth and Rock fill Dams (Modes of failure in earth dams)
Week 11	Earth and Rock fill Dams (Seepage through the body of the dam), Earth and Rock fill Dams (Design Consideration of an Earth Dams)
Week 12	Earth and Rock Fill Dams (SEEPAGE CONTROL A-Seepage Control through the body of the Dam)
Week 13	Earth and Rock fill Dams (SEEPAGE CONTROL B- Seepage Control Through the Foundation)
Week 14	Earth and Rock fill Dams (Location of a phreatic line)
Week 15	Earth and Rock fill Dams (Stability of Slopes), Earth and Rock fill Dams (Pore Water Pressure)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, Water Resources Publications, Colorado, U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, By: R. S. Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & Bros, Roorkee (U.P.), India,1982.	No

	3. Earth-Rock Dams, Engineering Problems of Design and Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hinds, In three Volumes, John Wiley and Sons, Inc., New York, 1961.	
Recommended Texts	Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., and Villars, M. T. (2005). Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications. Paris, UNESCO.	No
Websites	https://www.youtube.com/channel/UCq1v13fN72524RRtY0mMC9A	

Module Information
معلومات المادة الدراسية

Module Title	**Engineering Management and Economics**		**First Semester**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	4U	**Semester of Delivery**	1
Administering Department	Dams and water Resources	**College**	Engineering
Module Leader	Dr.Rasha M. Sami	**e-mail**	Rasha.fadhil@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	PhD
Module Tutor		**e-mail**	
Peer Reviewer Name	Anmar A.M. Al-Talib	**e-mail**	Anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	dams and water fourth-stageEngineering Management and Economics are essential for resources engineering students. Introducing students to the principles of economics to evaluate and select the best projects economically. In addition to teaching students the project management methods according to duration and how to manage it financially.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and apply fundamental concepts of engineering economy (i). 2. Classify the interest rate & define the Cash Flow Diagram (i). 3. Recognize water resources project planning and management(i). 4. Economically evaluate and analysis engineering projects (ii). 5. Compare engineering alternatives to choose the most feasible one. (iii). 6. Calculate project compelation time and allocation resources. (iii). 7. Managing project finiacially and compute tender pricing (iii).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • **Fundamentals of Engineering Economics** *:* Principles of Engineering Economics, Cash Flow Diagram, Type of interest compounds (4 hr). Present and Future worth, Uniform Annual Series, Uniform Gradient Series, (4 hr).

	• **Evaluation and Comparison of Engineering Projects:** Present Worth (PW) Method, Future Worth (FW)Method (4 hr). Annual Worth (AW) Method, Benefit/Cost Ratio Method (4 hr). Internal Rate of Return Method, Minimum Attractive Rate of Return (MARR) (4 hr). • **Project Financial Management:** Tender and Project Pricing , Crashing project(4 hr). Progress Payments, Cash Flow Forecasting (4 hr). • **Engineering Project Management :** Project Management •Contract Parties.•The Resident Engineer.• Contract Documents. •Safety and Risk. (4 hr). Construction Project Management System. •work break downstructure Project Planning (4 hr). • **Project Scheduling and Resources Allocation:** Planning and Scheduling. •Techniques for Planning and Scheduling. •Bar–Chart Method (Gantt chart). (4 hr). Network Analysis Method (Critical Path Method CPM) (4 hr). Resources Allocation Using CPM: Allocation of Labour & Machines. (4 hr). Project Evaluation and Review Technique (PERT) (4 hr).

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The essential strategy of this module is to motivate students to evaluate and compare the actual engineering project so they can manage the company, monitor real project progress (time and money), and hand it in compelation time or before. With this knowledge, they can apply software like Primavera to manage their project in the future.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, Principles of Engineering Economics, Cash Flow Diagram, Type of interest compounds
Week 2	Relationship among: Present and Future worth, Uniform Annual Series, Uniform Gradient Series
Week 3	Comparison of Engineering Projects: Present Worth (PW) Method, Future Worth (FW)Method (4 hr).
Week 4	Annual Worth (AW) Method, Benefit/Cost Ratio Method (4 hr).
Week 5	Internal Rate of Return Method, Minimum Attractive Rate of Return (MARR) (4 hr).
Week 6	Tender and Project Pricing, Crashing project
Week 7	Progress Payments, Cash Flow Forecasting.
Week 8	**First Monthly Exam**
Week 9	Define Project Management, Contract Parties., The Resident Engineer, Contract Documents.

Week 10	Construction Project Management System. ,work break down structure Project Planning
Week 11	Techniques for Planning and Scheduling:Bar–Chart Method (Gantt chart).
Week 12	Network Analysis Method (Critical Path Method CPM), Activity on Arrow (AOA) & Activity on Node (AON).
Week 13	Resources Allocation Using CPM: Allocation of Labour & Machines.
Week 14	Project Evaluation and Review Technique (PERT).
Week 15	**Second monthly 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-** Engineering Economy (7th ed.), L. Blank and A. Tarquin (2012), McGraw-Hill. **2**-Water Resources Systems Planning and Management, S.K. Jain and V.P. Singh (2003), Elsevier. **3**-Water Resources Handbook for Economics, NRCS (1998).	Yes
Recommended Texts	Engineering Economic Analysis, Oxford, New York,2004	Yes
Websites	https://www.koenig-solutions.com/primavera-P6-professional-project-management-rel-19-Ed-1-	

Module Information
معلومات المادة الدراسية

Module Title	**Design of Irrigation and Drainage Networks**	**First Semester**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**

Module Level	4U	**Semester of Delivery**	1
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Azza Nsralla Al-Talib	**e-mail**	a.altalib@uomosul.edu.iq
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	M.Sc.

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	students in fourth-stageThe design of irrigation and drainage network is the basic subject for the dams and water resources engineering department that from this subject students will learn and practice to compute how to design irrigation and drainage network for deferent irrigation projects with different dimensions consider standard designs for water resources ministry in Iraq.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Layout an irrigation and drainage network on a contour map. 2. Calculate served area and discharge according to water supply system. 3. Design earth canals, lined canals and drains according to the design criteria for Iraq. 4. Draw the synoptic diagram for canals and drains shows the ground level, water level and water level slope which are more important for design. 5. Determine whether or not the design for irrigation and drainage system is valid according to the design standards for Iraq. 6. Calculate the seepage loss and decided if the canal needed to line or not. 7. Draw the longitudinal section which shows the dimensions for canals and drains and the cross sections show the amount of cutting and filling.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction, Classification of Irrigation and drainage network, Canal system, drainage system (4hrs) • Nomenclature a numbering Irrigation and drainage network, Layout of Irrigation and drainage network(4hrs) • The synoptic diagram of water levels in canals, class work1(4hrs) • The synoptic diagram of water levels in drains, class work2(4hrs)

	• Water supply system, command area, class work3(4hrs) • Unlined Canals , Types of unlined canals(4hrs) • hydraulic design of unlined canal section of Lacey Equations & Tractive Force Theory, class work4(4hrs) • hydraulic design of unlined canal using general design method, class work5(4hrs) • Methods of seepage losses, class work6(4hrs) • Standard dimensions and Hydraulic design of lined canal, class work7(4hrs) • Standard dimensions and discharge of drains, Hydraulic design of drains, class work8(4hrs) • Longitudinal section details, class work9(4hrs) • Cross section details , class work10(4hrs) • **First monthly Exam**(2hrs) • **Second monthly Exam**(2hrs) • **Preparatory week before the final Exam**(4hrs) • **Final Exam**(3hrs)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage student's participation in the tutorial exercises close to reality in terms of contour maps, network layout, calculating the service area, then finding the discharge according to the used irrigation system, and designing the sections of canals and drains according to the Iraqi design criteria ,in addition of using computer programs such as AUTOCAD in calculating areas and drawing a synoptic diagram,longitudinal and cross sections.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Classification of Irrigation and drainage network, Canal system, drainage system
Week 2	Nomenclature a numbering Irrigation and drainage network, Layout of Irrigation and drainage network
Week 3	The synoptic diagram of water levels in canals, class work1
Week 4	The synoptic diagram of water levels in drains, class work2
Week 5	Water supply system, command area, class work3

Week 6	Unlined Canals , Types of unlined canals
Week 7	**First monthly Exam**
Week 8	Tractive Force Theory, class work4 & hydraulic design of unlined canal section of Lacey Equations
Week 9	hydraulic design of unlined canal using general design method, class work5
Week 10	Methods of seepage losses, class work6
Week 11	Standard dimensions and Hydraulic design of lined canal, class work7
Week 12	Standard dimensions and discharge of drains, Hydraulic design of drains, class work8
Week 13	Longitudinal section details, class work9
Week 14	Cross section details **,** class work10
Week 15	**Second monthly Exam**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	○ Design Manual for Irrigation and Drainage, Pencol Engineering Consultants, London	No
Recommended Texts	○ Theory and Design of irrigation structures (vol.1 By: Varshney,R.S. ,Gupta,S.C. and Gupta, R. NEMCHAND & BROS, ROORKEE,INDIA,1977	Yes
Websites	https://uclouvain.be/en-cours-2023-lbres2104	

Module Information
معلومات المادة الدراسية

Module Title	**Engineering Project**		**First Semester**
Module Type	**C**		☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**
Module Level	4U	**Semester of Delivery**	1
Administering Department	DWRE	**College**	COE
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The purpose of the Graduation Project is to assure/ascertain that the students have acquired the skills, knowledge, and concepts necessary to perform well when they leave the university. Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. Students are also expected to show how proficient they are in solving real-world problems with certain constraints for the outcome-based evaluation by the review board.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: Understand and apply the fundamentals of engineering-design practices and procedures LO1. Participate in teamwork activities. LO 2. Implement the techniques of oral and written presentations. LO 3. Identify an engineering problem and assess alternative solutions. LO 4. Apply project management fundamentals. LO 5. Understand the ethics of the engineering profession and water resources engineering issues. LO 6. Interact with industry and related non-governmental organizations. LO 7.
Indicative Contents المحتويات الإرشادية	The graduation project will be a meaningful experience that provides a student with the opportunity for in-depth learning about a selected topic. The purpose of the project is to assure that the student is able to apply, analyze, synthesize, and evaluate information and communicate significant knowledge and understanding through a presentation. The project will be under the guidance and direction of the dept. faculty/administrators and will be assessed by an evaluation team.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Technical Report - Literature Review and Analysis - Project Problem Formulation and Solutions (Goals) - Report Organization - According to the template of the department Methodology and Procedures - Design - Implementation - Testing Individual Student Evaluation - Individual Contribution - Oral Presentation - Team Work Individual Student Evaluation by the Supervisor - Individual Contribution - Student Commitment - Team Work.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Research Plan
Week 2	Data collection
Week 3	Previous Works
Week 4	Study the Problem
Week 5	Propose Solutions
Week 6	Analysis of Proposed Solutions
Week 7	Design the Proposed Solution
Week 8	Solutions Application
Week 9	Make the Required Measurements
Week 10	Analysis of the Results
Week 11	Design Reconsideration
Week 12	Project Testing and begin writing
Week 13	Project Writing

Week 14	Project report submission
Week 15	Presentation to the review board and oral examination

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Graduation project writing instructions template تعليمات كتابة مشروع التخرج	No
Recommended Texts		No
Websites		

Module Information معلومات المادة الدراسية				
Module Title	**Design of Hydraulic Structures**		**Second Semester**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Level	U	**Semester of Delivery**	1	
Administering Department	DWRE	**College**	COE	
Module Leader	Nashwan Kamal Aldeen Mohammed	**e-mail**	nashwan.alomari@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5. To understand the canal headwork, and its use, and perform barrage design steps. 6. To understand the importance of using channel transitions and develop the ability to design a transition. 7. To ability to design a syphon structure (as a sample of cross drainage works). 8. To understand and ability to design some hydraulic structures (culverts and Sharda-type falls).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the common methods of calculating seepage and uplift pressure under different hydraulic structures, 2. Apply the basic concepts of engineering to design the required hydraulic structures' floor thickness, 3. Formulate preliminary hydraulic design steps for some hydraulic structures, 4. Develop and solve design problems and analyze the data to evaluate the feasibility of components of the canal Head works (barrage types), some types of flow transition, cross drainage works, and culverts, 5. Evaluate and analyze the safety of the canal Head works structure (barrage types) and culvert, 6. Demonstrate the ability to lead and productively participate in group situations via assigning multidisciplinary design projects for some of the hydraulic structures.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Canal Headworks (barrage types)

	- Introduction. - Defining the components of the barrage - Design steps of the undersluice, other barrages, and side main canal. [35 hrs] • Transitions - Introduction of transitions (R.S Chaturvedi's, Mitra's, and Hind's transitions). - Design of transitions (Hind's transitions). [10 hrs]. • Cross drainage works. - Syphon design. [10 hrs]. • Culvert. - Introduction and design example of the culvert. [10 hrs]. • Design of canal falls (Sharda-type fall). [10 hrs].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in classes, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and practical designing of the hydraulic structures. Powerpoint presentations and boards are used in the classroom. Examples and problems will be solved and illustrated on the classroom board. Tutorials are also organized to establish closer contact with students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Design of canal Head works (barrage types)
Week 2	Design of undersluice
Week 3	Design of other barrage
Week 4	Design of head regulator
Week 5	Design and apply the example of the barrage

Week 6	Continue a design and apply the example of the barrage
Week 7	Continue a design and apply the example of the barrage
Week 8	Mid-term Exam + Transitions: introduction of some types of flow transition.
Week 9	Design and applied the example of transition
Week 10	Cross drainage works – Syphon design
Week 11	Design and apply the example of syphon
Week 12	Introduction of culverts.
Week 13	Design and apply the example of culverts.
Week 14	Introduction of Sharda-type fall
Week 15	Design and apply the example of a Sharda-type fall
Week 16	**A preparatory week before the Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
Required Texts	Varshney, R.S., Gupta, S. C., Gupta, R. L., (1979) "*Theory & design of irrigation structures*". Nem Chand & Bros; Roorkee, India.	Yes
Recommended Texts	4. Asawa, G. L. (2008) "*Irrigation and Water Resources Engineering*" New Age International(P) Limited, Publishers. 5. Chanson, Hubert., (2004) "*The Hydraulics of Open Channel Flow: An Introduction*" Elsevier. 6. Chow, Ven te., (1959) "*Open Channels Hydraulics*" Mc Graw Hill. 7. Schall, J.D., Thompson, p. L., Zeryes, S. M., Kilgore, R. T., and Morris, J. L. (2012) "*Hydraulic design of Highway culverts* " (Report No . FHWA – HIF – 12 – 026 HD55).	No

Module Information
معلومات المادة الدراسية

Module Title	Design of Sprinkler and Drip Irrigation Systems		**Second Semester**
Module Type	Core		☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☒ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	2
Administering Department	Dam and Water Resources Engineering	**College**	College of Engineering
Module Leader	Dr. Zeyad Ayoob Sulaiman	**e-mail**	z.alsinjari@uomosul.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Dr. Anmar Al Talib	**e-mail**	anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims
أهداف المادة الدراسية

The aim of the Design of Sprinkler and Drip Irrigation Systems module is to provide learners with a comprehensive understanding of the principles, techniques, and considerations involved in designing efficient and effective sprinkler and drip irrigation systems. The module focuses on the following specific aims:

1. Understanding Irrigation Design Principles: The module aims to familiarize learners with the fundamental principles of irrigation design. This includes concepts such as water requirements, soil properties, crop water needs, and environmental factors that influence irrigation system design.
2. Sprinkler System Design: The module aims to equip learners with the knowledge and skills to design sprinkler irrigation systems. This involves understanding different types of sprinklers, their operating characteristics, and selecting appropriate sprinkler heads, spacing, and layout patterns to ensure uniform water distribution across the irrigated area.
3. Drip Irrigation System Design: The module aims to provide learners with a comprehensive understanding of drip irrigation system design. This includes topics such as emitter selection, emitter spacing, pipe layout, filtration and pumping requirements, and managing pressure variations to ensure precise water delivery to individual plants or root zones.
4. System Components and Sizing: The module aims to familiarize learners with the various components of sprinkler and drip irrigation systems, such as pipes, valves, filters, pumps, and control systems. Learners will gain the skills to appropriately size and select these components based on factors such as flow rate, pressure requirements, and system layout.

	5. Design Considerations and Constraints: The module addresses the practical considerations and constraints that may influence irrigation system design. These may include factors such as topography, soil conditions, land availability, water quality, local regulations, and budgetary limitations. Learners will learn to analyze and integrate these factors into their design decisions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students who successfully complete this course have: 1. Learned characteristics of sprinkler and drip irrigation systems, (i) 2. Understood economics of irrigation, (i) 3. Able to design various types of pressurized irrigation systems after collecting the required design data and analyzing these data in a way that suits the design, (i) and (ii) 4. Able to select a suitable irrigation system for a given situation, (ii) 5. able to select the most economist irrigation design alternative , (vi)
Indicative Contents المحتويات الإرشادية	The Design of Sprinkler and Drip Irrigation Systems module covers a range of topics to provide learners with a comprehensive understanding of irrigation system design. The indicative contents of the module may include: 1. Introduction to Irrigation Systems (7hr) • Definition and importance of irrigation • Overview of sprinkler and drip irrigation systems • Advantages and limitations of each system 2. Irrigation Design Principles (10hr) • Water requirements of crops • Soil properties and their impact on irrigation design • Factors influencing crop water needs • Environmental considerations (e.g., climate, evapotranspiration) 3. Sprinkler System Design (15hr) • Types of sprinklers and their characteristics • Sprinkler selection based on crop and application requirements • Sprinkler spacing and layout patterns for uniform water distribution • Hydraulic calculations and pressure regulation • Design considerations for slope and irregular-shaped fields 4. Drip Irrigation System Design (15hr) • Drip system components and their functions • Emitter selection and placement • Determining emitter spacing and flow rates • Designing sub-main and lateral pipe layout • Filtration and pumping requirements • Pressure compensation and managing pressure variations 5. System Components and Sizing (15hr) • Pipes, valves, and fittings in irrigation systems • Selecting appropriate pipe materials and sizes • Sizing and selecting pumps based on system requirements • Designing filtration and fertigation systems 6. Design Considerations and Constraints (15hr) • Topographic considerations and field layout design

	• Soil and water quality assessments • Budget constraints and cost analysis 7. System Evaluation (7hr) • Monitoring and assessing water distribution uniformity • Evaluating system efficiency and performance • Troubleshooting common issues 8. Case Studies and Design Projects (10hr) • Real-world examples of sprinkler and drip irrigation system design • Design projects to apply learned concepts and principles 9. Emerging Technologies and Innovations (7hr) • Introduction to new technologies and trends in irrigation design • Exploration of precision irrigation, remote sensing, and data-driven decision-making Note: The above list represents indicative contents and may vary depending on the specific curriculum or course framework.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	When designing the module for the Design of Sprinkler and Drip Irrigation Systems, several strategies can be employed to enhance learning outcomes and engagement. The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of real-world design projects. By implementing these strategies, the Design of Sprinkler and Drip Irrigation Systems module can create an engaging and effective learning experience that prepares learners with the knowledge and skills needed for designing efficient and sustainable irrigation systems.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Sprinkler irrigation/Sprinkler irrigation basic concept/Advantages and problems of sprinkler irrigation /Basic and supplementary components sprinkler irrigation system/Types of sprinkler irrigation systems
Week 2	Fundamentals of sprinkler irrigation/Single sprinkler water distribution/Layout of stationary system/Hydraulic of sprinkler nozzle
Week 3	Uniformity of sprinkler water distribution

Week 4	Alternate setting of sprinkler laterals/Sprinkler spray losses and sprinkler irrigation efficiency
Week 5	Sprinkler lateral pipes/Fundamentals of flow hydraulic pipes/Allowable pressure variation /Sprinkler pipe size
Week 6	Friction head loss/Layout of sprinkler pipes/Moving and operation sprinkler pipes/Sprinkler pipe material
Week 7	Sprinkler irrigation major pipes distribution system/Types of major pipes distribution system/Design requirements/ Distribution system layout
Week 8	Design methods (flow velocity method, allowable friction method, economic analysis method)
Week 9	Economic analysis general procedure/ Total dynamic head
Week 10	Applications on design of main pipe systems
Week 11	Trickle irrigation/Advantages and problems of drip irrigation/Trickle system basic component/Soil-water-crop factors
Week 12	Emitters selection/Hydraulic of trickle network
Week 13	Hydraulic Design of the main pipeline of pipe network
Week 14	General notes about evaluation of on- farm irrigation systems
Week 15	Applications of Drip Irrigations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	On-farm irrigation systems engineering\by A.Y.Hachum, and H.I.Yasin. textbook- Mosul University,1992.	Yes
Recommended Texts	Recahrd H. Cuenca Irrigation System Design: An Engineering Approach, 1989.	Yes
Websites		

Module Information
معلومات المادة الدراسية

Module Title	**Dams Engineering**		**Second Semester**
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	UGx11 4	**Semester of Delivery**	2
Administering Department	DWRE	**College**	Collage of Engineering
Module Leader	Dr. Yousif Hashim Abdullah Al-Aqeeli	**e-mail**	y.alaqeeli@uomosul.edu.iq
Module Leader's Acad. Title	Assist Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Ali Ahmad Abdulmawjood	**e-mail**	aliabdulmawjood@uomosul.edu.iq
Peer Reviewer Name	Dr. Anmar Abdul aziz Al-Talib	**e-mail**	anmar.altalib@uomosul.edu.iq

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	26. An ability to specify the type of gravity dam according to the conditions of valley. (i) 27. An ability to analyses the forces that affected to gravity (i), (ii) 28. An ability to identify the solutions for the problems that may be appear in the analyses of gravity dams. (iii) 29. An ability to specify the type of arch dam according to the conditions of valley. (i) 30. Formulate a preliminary design of gravity and arch Dams base on the chosen type. (ii) 31. Formulate a preliminary design of arch Dams base on the chosen type. (ii) 32. An ability to specify the type of spillway. 33. An ability to design the ogee spillway.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	25. Analyses the forces that affected to gravity 26. Identify the solutions for the problems that may be appear in the analyses of gravity dams. 27. Estimate a preliminary design. 28. Specify the type of arch dam according to the conditions of valley. 29. Estimate a preliminary design of arch Dams base on the chosen type. 30. Specify the type of spillway. 31. Design the ogee spillway.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

	Gravity dams, Advantages of gravity dams, disadvantages of gravity dams, Forces acting on gravity dam. [10 hrs] Modes of failure and criteria for structural stability of gravity dam, Principles and shear stress. [10 hrs] Elementary profile of the gravity dam, Design considerations, Stresses development in an elementary profile. [12 hrs] Limiting height of gravity dam, Practical cross section of gravity dam [12 hrs] Arch dams, Advantages of arch dams, Disadvantages of arch dams, Types of arch dams, Design of Arch Dam. [15 hrs] Spillway (Component of spillways, Types of spillways), Spillway (Design Principles of Ogee Spillway). [15 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Gravity dams, Advantages of gravity dams, disadvantages of gravity dams
Week 2	Forces acting on gravity dam
Week 3	Modes of failure and criteria for structural stability of gravity dam
Week 4	Principles and shear stress, Elementary profile of the gravity dam
Week 5	Design considerations, Stresses development in an elementary profile
Week 6	Limiting height of gravity dam
Week 7	Mid-term Exam
Week 8	Practical cross section of gravity dam
Week 9	Practical cross section of gravity dam
Week 10	Arch dams, Advantages of arch dams, Disadvantages of arch dams
Week 11	Types of arch dams, Design of Arch Dam
Week 12	Design of Arch Dam
Week 13	Spillway (Component of spillways, Types of spillways)

Week 14	Spillway (Design Principles of Ogee Spillway)
Week 15	Spillway (Design Principles of Ogee Spillway)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. Hydraulics of Dams and Reservoirs, By: Fuat Senturk, Water Resources Publications, Colorado, U.S.A.,1994. 2. Theory and Design of Irrigation Structures, Vol. II, By: R. S. Varshney, S. C. Gupta and R. L. Gupta, Nem Chand & Bros, Roorkee (U.P.), India,1982. 3. Earth-Rock Dams, Engineering Problems of Design and Construction, By: J. L. Sherard, R. J. Woodward, S. F. Gizienske and W. A. Clevenger, John Wiley and Sons, Inc., New York, 1963. 4. Engineering for Dams, By: W. P. Greager, J. D. Justin and J. Hinds, In three Volumes, John Wiley and Sons, Inc., New York, 1961.	No
Recommended Texts	Loucks, D. P., Van Beek, E., Stedinger, J. R., Dijkman, J. P., and Villars, M. T. (2005). Water Resources Systems Planning and Management: An Introduction to Methods, Models and Applications. Paris, UNESCO.	No
Websites	https://www.youtube.com/channel/UCq1v13fN72524RRtY0mMC9A	

Module Information
معلومات المادة الدراسية

Module Title	**Estimation and Specifications**		**Second Semester**
Module Type	**S**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	U	**Semester of Delivery**	2
Administering Department	DWRE	**College**	ENGINEERING
Module Leader	Mohammad Awni Khattab	**e-mail**	m.almukhttar@uomosul.edu.iq
Module Leader's Acad. Title	assistant teacher	**Module Leader's Qualification**	Msc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	ANMAR ALTALB	**e-mail**	E-mail

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	34. Learn the basics of estimation and its types 35. To understand the constructional paragraphs of the facilities 36. Studying the various methods used to estimate the quantities of materials used in construction 37. To learn how to calculate works cost 38. This course deals with clarifying the basic concepts of Analysis Reinforced of slabs and beams 39. Learn the basics of structural drawing 40. Learn the basics of designing and reading engineering plans
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	32. Excavation and Foundations stripe and raft calculations 33. wall building works and estimation of Block , bricks and stone 34. Identify the wooden template 35. Analysis Reinforced of slabs and beams 36. Calculation of the amount of concrete 37. Design and Draw (Map of house+ foundation map+ section in wall) 38. Design and Draw (home electrical network) 39. Design and Draw (home sewage networks) 40. Design and Draw (the Electrical network in house) 41. Design and Analysis of Finishing works
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Introduction to Estimation and Specifications, Estimation types definitions, Introduction of Structural drawing [7 hrs]. Excavation of stripe and raft foundation [8 hrs]. Estimation of (cement, sand, gravel) for stripe and raft foundation, Estimation of steel reinforced , Estimation of steel reinforced for stripe and raft foundation [20hrs]. walls building works and estimation of materials, stone building, Bricks building, Block building [20 hrs]. estimation of materials for wood form types [8 hrs] estimation of materials for reinforced of slab, Reinforced of beams, Estimation of materials for finishing works[15 hrs].

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Estimation and Materials Specification.
Week 2	Excavation of Foundations,
Week 3	Excavation of stripe and raft foundation
Week 4	Estimation of (cement, sand, gravel) for stripe and raft foundation
Week 5	Estimation of steel reinforced
Week 6	Estimation of steel reinforced for stripe and raft foundation
Week 7	Mid-term Exam
Week 8	Cubed wall works and estimation of materials
Week 9	stone building,
Week 10	Bricks building
Week 11	Block building,
Week 12	estimation of materials for wood form types

Week 13	estimation of materials for reinforced of slab
Week 14	Reinforced of beams
Week 15	Estimation of materials for finishing works
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction; syllabus; Draw (house plan).
Week 2	Lab 2: drawing (View).
Week 3	Lab 3: drawing (Foundations map).
Week 4	Lab 4: Drawing (the wall section).
Week 5	Lab 5: Drawing (windows and doors)
Week 6	Lab 6: Drawing (stair ways plan).
Week 7	Lab 7: Drawing (reinforced of stair).
Week 8	Lab 8: Drawing (slabs).
Week 9	Lab 9: Drawing (beams).
Week 10	Lab 10: Drawing (sewer network).
Week 11	Lab 11: Drawing (Water Supply network).
Week 12	Lab 12: Drawing (electrical network)
Week 13	Lab 13: Drawing (isometric)
Week 14	Lab 14: Drawing (architectural facade)
Week 15	Lab 15: Drawing (interior design)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	VANZIRANI, V.N., CHANDOLA, S.P. "Civil Engineering Estimating and Costing ". first edition, 1982	Yes
Recommended Texts	Civil Engineering and Costing, S.P. Mahajan, 624. 1042, M214.	No
Websites	https://www.scribd.com/doc/263166656	

Module Information
معلومات المادة الدراسية

Module Title	**English IV**		**Module Delivery**
Module Type	**Support**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Level	4	**Semester of Delivery**	2
Administering Department	DWRE	**College**	COE
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims
أهداف المادة الدراسية

This course focuses on building upon the language skills and knowledge gained in previous levels, aiming to further develop students' fluency, accuracy, and overall language proficiency. By the end of the course, students will gain these skills:

1) Expanding Vocabulary: Enhancing students' vocabulary range by introducing them to new words, idiomatic expressions, and collocations. This includes both general and topic-specific vocabulary relevant to the upper intermediate level.
2) Grammar Development: Consolidating and expanding students' understanding of English grammar. This may involve revisiting and reinforcing previously learned grammar points and introducing more complex structures and tenses.
3) Reading Comprehension: Improving reading skills through a variety of texts, such as articles, short stories, and excerpts from novels. Students will focus on understanding main ideas, identifying supporting details, and inferring meaning from context.
4) Writing Skills: Developing writing abilities through guided exercises and assignments. Students may be encouraged to write essays, reports, letters, or other types of texts, with an emphasis on coherence, cohesion, and accuracy.
5) Listening Comprehension: Enhancing listening skills through a range of authentic audio materials, including dialogues, interviews, and lectures.

	Students will practice understanding main ideas, specific details, and implied information. 6) Speaking and Conversation: Encouraging students to express themselves confidently and fluently through various speaking activities. This includes engaging in discussions, debates, role-plays, and presentations, with an emphasis on accuracy, coherence, and appropriate language use. 7) Cultural Awareness: Broadening students' understanding of English-speaking cultures and societies through authentic materials and discussions on various topics. This aims to enhance their intercultural communication skills and foster a deeper appreciation of diverse perspectives.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	CLO 1: Comprehend and analyze various written and spoken texts: Demonstrate the ability to understand the main ideas, key details, and nuances of different types of texts, including articles, essays, speeches, and dialogues. CLO 2: Communicate effectively in spoken interactions: Engage in short conversations using appropriate language and effective communication strategies. Express ideas, opinions, and experiences clearly and coherently. Demonstrate active listening skills and respond appropriately to others. CLO 3: Produce well-structured written texts: Generate logically organized and cohesive paragraphs in written assignments. Apply appropriate grammar, vocabulary, and sentence structures to enhance clarity and coherence. Use effective writing strategies such as introductions, topic sentences, transitions, and conclusions. CLO 4: Employ appropriate vocabulary and expressions: Select and use a wide range of vocabulary to accurately express feelings, opinions, and personal experiences. Recognize, understand, and utilize phrasal verbs and collocations to enhance language fluency and natural expression. CLO 5: Apply effective language organization and coherence: Demonstrate the ability to structure and organize written and spoken communication effectively. Use appropriate discourse markers and transitional words to establish coherence and facilitate smooth flow of ideas. These course learning outcomes aim to develop the students' overall English language proficiency and skills in listening, speaking, reading, and writing. By the end of the course, students should be able to understand and analyze various texts, participate actively in conversations, produce well-structured written texts, employ appropriate vocabulary and expressions, and

	demonstrate effective language organization and coherence.
Indicative Contents المحتويات الإرشادية	Grammar Vocabulary Everyday English
earning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	UNIT 1 Home and Away!: Grammar: Simple, continuous, perfect, active and passive. Reading: Saro's story "Lost and found".
Week 2	UNIT 1 Home and Away!: Speaking: Missing words.
Week 3	UNIT 1 Home and Away!: Listening: Things I miss from home. Vocabulary: Compound words.
Week 4	Report submission feedback and instructions how to make a good presentation.
Week 5	Presentation day, giving feedback and presentation notes.
Week 6	UNIT 2 Been there, got the T-shirt: Grammar: Present perfect simple and continuous. Reading: Our plastic planet.
Week 7	UNIT 2 Been there, got the T-shirt: Speaking: Fillers, adding emphasis.
Week 8	UNIT 2 Been there, got the T-shirt: Listening: Dreams come true. Vocabulary: Hot verbs, make and do.
Week 9	UNIT 3 News and Views: Grammar: Narrative tenses. Reading: Book at bedtime.
Week 10	UNIT 3 News and Views: Speaking: Giving and receiving news.
Week 11	UNIT 3 News and Views:

	Listening: The clinging woman. Vocabulary: Books and films
Week 12	Speaking test for group 1 of students. Each students takes about 5-7 minutes for the test.
Week 13	Speaking test for group 2 of students. Each students takes about 5-7 minutes for the test.
Week 14	Reviewing the Units 1-3, checking the workbook answers, and open discussion.
Week 15	Midterm exam.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	SOARS, J. & SOARS, L. 2014. New Headway: Upper-Intermediate Fourth Edition: Student's Book and iTutor Pack, OUP Oxford.	No

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Project**			**Second Semester**	
Module Type	**C**			☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Level	4U		**Semester of Delivery**	2	
Administering Department	DWRE	**College**	COE		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The purpose of the Graduation Project is to assure/ascertain that the students have acquired the skills, knowledge, and concepts necessary to perform well when they leave the university. Each student will use educational tools to broaden his/her knowledge about a particular, self-selected topic. Students are also expected to show how proficient they are in solving real-world problems with certain constraints for the outcome-based evaluation by the review board.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On successful completion of this course, students will be able to: Understand and apply the fundamentals of engineering-design practices and procedures LO1. Participate in teamwork activities. LO 2. Implement the techniques of oral and written presentations. LO 3. Identify an engineering problem and assess alternative solutions. LO 4. Apply project management fundamentals. LO 5. Understand the ethics of the engineering profession and water resources engineering issues. LO 6. Interact with industry and related non-governmental organizations. LO 7.
Indicative Contents المحتويات الإرشادية	The graduation project will be a meaningful experience that provides a student with the opportunity for in-depth learning about a selected topic. The purpose of the project is to assure that the student is able to apply, analyze, synthesize, and evaluate information and communicate significant knowledge and understanding through a presentation. The project will be under the guidance and direction of the dept. faculty/administrators and will be assessed by an evaluation team.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Technical Report Literature Review and Analysis - Project Problem Formulation and Solutions (Goals) - Report Organization - According to the template of the department - Methodology and Procedures Design - Implementation - Testing - Individual Student Evaluation Individual Contribution - Oral Presentation - Team Work - Individual Student Evaluation by the Supervisor Individual Contribution - Student Commitment - Team Work. -

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Research Plan
Week 2	Data collection
Week 3	Previous Works
Week 4	Study the Problem
Week 5	Propose Solutions
Week 6	Analysis of Proposed Solutions
Week 7	Design the Proposed Solution
Week 8	Solutions Application
Week 9	Make the Required Measurements
Week 10	Analysis of the Results
Week 11	Design Reconsideration
Week 12	Project Testing and begin writing
Week 13	Project Writing
Week 14	Project report submission
Week 15	Presentation to the review board and oral examination

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Graduation project writing instructions template تعليمات كتابة مشروع التخرج	No