استمارة وصف البرنامج الأكاديمي للكليات والمعاهد
للعام الدراسي2023-4 202

وزارة التعليم العالي والبحث العلمي
جـــهاز الإشـــراف والتقـــويم العلـمي
دائرة ضمان الجودة والاعتماد الأكاديمي

الجامعة : ذي قار
الكلية/ المعهد: كلية الهندسة
القسم العلمي :- قسم الهندسة الكهربائية و الالكترونية
تاريخ ملء الملف : 2024/3/20

التوقيع:
السيد رئيس القسم: ا.م.د احمد كريم عبد
التاريخ: ٢٠٢٤/٣/٢٥

دقق الملف من قبل
شعبة ضمان الجودة والأداء الجامعي
اسم مدير شعبة ضمان الجودة والأداء الجامعي:
التاريخ :- ٢٠٢٤/٣/٢١
التوقيع:-

التوقيع:
السيد المعاون العلمي: الاستاذ الدكتور [illegible]
التاريخ: ٢٠٢٤/٣/٢١

التوقيع:
السيد العميد:
التاريخ:

وصف البرنامج الأكاديمي

1- رؤية البرنامج:-

تتمثل رؤيتنا في أن نكون أحد الأقسام المنافسة والرائدة في مجال الهندسة الكهربائية والإلكترونية محليًا وإقليميًا وأن نخرج مهندسين مبتكرين وباحثين مبدعين ملتزمين بالقيم المهنية ومساهمين فاعلين في تنمية المجتمع بطريقة مستدامة.

2- رسالة البرنامج:-

تقديم استراتيجيات التعليم الحديثة وتسهيل التعلم الجيد للطلبة جنبًا إلى جنب مع المهارات الهندسية العملية لإعداد الخريجين المتميزين في الهندسة الكهربائية قادرين على المشاركة في مجالات العمل والصناعة. بناء كوادر هندسية لها القدرة على مواكبة الدراسات المتقدمة والتقنيات المتطورة في الهندسة الكهربائية وتفرعاتها.

3- اهداف البرنامج: -

A. اعداد الخريجين في مجال فهم وتصميم الدوائر الكهربائية ومنظومات الكهرباء واستخدام مهارات الحاسوب وتطوير البرامج.

B. القدرة على فهم المشكلات المراد حلها وإيجاد الهدف المطلوب ممثل بالحل لهذه المشكلات من خلال جمع البيانات للدوائر الالكترونية والبرامج العلمية وتحليلها.

C. رفد المسيرة التعليمية داخل القسم بالتدريسيين والباحثين ورفد المؤسسات العامة بمهندسين اكفاء في مجال الاختصاص.

4- الاعتماد البرامجي :-

القسم بصدد الاعداد لنيل الاعتمادية من منظمة **ABET**

5- المؤثرات الخارجية: -

زيارات ميدانية وعلمية.

6- البرنامج				
هيكل البرنامج	عدد المقررات	وحدة دراسية	النسبة المئوية	ملاحظات *
متطلبات المؤسسة	7	16	7%	
متطلبات الكلية	5	26	11%	
متطلبات القسم	32	198	82%	
التدريب الصيفي	-	-	-	
أخرى				

7-وصف البرنامج				
السنة / الاولى الفصل الاول	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	UTQAR11	اللغة العربية	2	نظري 2
-2	UTQEN11	اللغة الإنكليزية	2	نظري 2
-3	ER 105	التفاضل والتكامل	8	نظري 6+ تمارين 2
-4	EEE 1110	دوائر كهربائية I	7	نظري 5+ عملي 2
-5	ER 106	رسم هندسي	7	نظري 3+ عملي 4
-6	ER 101	فيزياء	2	نظري 2

7-وصف البرنامج				
السنة / الاولى الفصل الثاني	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	UTQHR21	الديمقراطية وحقوق الانسان	2	نظري 2
-2	EEE 1220	فيزياء إلكترونية	5	نظري 4+ تمارين 1
-3	EEE 205	رياضيات تطبيقية	8	نظري 6+ تمارين 2
-4	EEE 1211	دوائر كهربائية II	8	نظري 5+ 2 عملي+ تمارين1
-5	UTQCO12	علم الحاسبات	4	نظري 2 + عملي 2
-6	ER 102	كيمياء	2	نظري 2

7-وصف البرنامج				
السنة / الثانية الفصل الاول	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	EEE 2121	الكترونيات I	7	نظري 4+عملي 2+ تمارين1
-2	EEE 2110	مكائن تيار مستمر	7	نظري 4+عملي 2+ تمارين1
-3	EEE 2112	دوائر كهربائية III	5	نظري 4+ تمارين1
-4	ER 207	برمجة حاسبات	4	نظري 2+عملي 2
-5	EEE 2120	منطق رقمي	5	نظري 4+ تمارين1

7-وصف البرنامج				
السنة / الثانية الفصل الثاني	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	UTQEE22	قيم تربوية	2	نظري 2
-2	EEE 2210	إشارات ونظم	5	نظري 3 + تمارين1
-3	EEE 2222	الكترونيات II	7	نظري 4 +عملي2+ تمارين1
-4	EEE 2211	مكائن تيار متناوب	7	نظري 4 +عملي2+ تمارين1
-5	EEE 2220	مجالات كهربائية ساكنة	5	نظري 4 + تمارين1
-6	UTQCB12	جرائم حزب البعث	2	نظري 2

7-وصف البرنامج				
السنة / الثالثة الفصل الاول	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	EEE 3110	طرق إحتمالية	5	نظري 4 + تمارين1
-2	EEE 3120	هندسة قدرة	5	نظري 4 +تمارين1
-3	EEE 3130	تصميم نظم رقمية	6	نظري 4 +عملي2
-4	EEE 3140	مكائن كهربائية متقدمة	5	نظري 4 +تمارين1
-5	EEE 3121	مجالات كهرومغناطيسية	5	نظري 4 + تمارين1

7-وصف البرنامج				
السنة / الثالثة الفصل الثاني	رمز المقرر أو المساق	اسم المقرر أو المساق		الساعات المعتمدة
-1	EEE 3210	موجات دقيقة	5	نظري 4 +تمارين1
-2	EEE 3220	نظم إتصالات	7	نظري 4 +عملي2+ تمارين1
-3	EEE 3230	تحليل نظم قدرة	5	نظري 4 + تمارين1
-4	EEE 3240	معالجة إشارات رقمية	5	نظري 4 + تمارين1
-5	EEE 3250	نظم تحكم خطية	6	نظري 4 +عملي2

7-وصف البرنامج				
السنة / الرابعة الفصل الاول	رمز المقرر أو المساق	اسم المقرر أو المساق	الساعات المعتمدة	
-1	EEE 4121	نظم إتصالات رقمية	5	نظري 4 + تمارين1
-2	EEE 4151	نظم تحكم عكسية	5	نظري 4 + تمارين1
-3	EEE 4110	معالجات دقيقة	5	نظري 4 + تمارين1
-4	EEE 4120	هوائيات وإنتشار موجات	5	نظري 4 +تمارين1
-5	EEE 4130	مواضيع بحثية	3	نظري 1 + عملي2

7-وصف البرنامج				
السنة / الرابعة الفصل الثاني	رمز المقرر أو المساق	اسم المقرر أو المساق	الساعات المعتمدة	
-1	**EEE 4210**	طاقات متجددة	5	نظري 4 + تمارين1
-2	**ER 401**	اخلاقيات المهنة	2	نظري 2
-3	**EEE 4220**	تطبيقات متحكمات دقيقة	7	نظري 4 + عملي 2+ تمارين1
-4	**EEE 4230**	إلكترونيات قدرة	7	نظري 4 + عملي 2+ تمارين1
-5	**EEE 4231**	مشروع هندسي	3	نظري 1 + عملي 2
-6	**EEE 4240**	إدارة مشاريع	2	نظري 2

8- مخرجات التعلم المتوقعة للبرنامج
المعرفة
1 : تمكين الطلبة من الحصول على المعرفة والفهم للإطار الفكري للهندسة الكهربائية. 2 : تمكين الطلبة من الحصول على المعرفة والفهم للمعايير الهندسية الخاصة بقسم الكهرباء ولإلكترونيك. 3 : تمكين الطلبة من الحصول على المعرفة والفهم للقوانين الأساسية في الهندسة الكهربائية والالكترونية. 4 : تمكين الطالب من فهم وتعلم برامج أخرى خارج اطار التخصص الدقيق.
المهارات
1 : تمكين الطلبة من حل المشاكل المرتبطة بالإطار الفكري للهندسة الكهربائية. 2 : تمكين الطلبة من تحليل المشكلات المتعلقة بالهندسة الكهربائية. 3: تمكين الطالب من اكتساب مهرات خارج مجال التخصص الدقيق.
القيم
1- التساؤول: البحث عن معلومات جديدة واثارة الأسئلة. 2- الاستنتاج والاستنباط: التفكير فيما هو ابعد من المعلومات المتوفرة لسد الثغرات فيها 3- المقارنة: ملاحظة اوجه النسب والاختلاف بين الأشياء. 4- التصنيف: وضع الأشياء في مجموعات وفق خصائص مشتركة.

9- استراتيجيات التعليم والتعلم
1- تزويد الطلبة بالأساسيات والمواضيع الإضافية المتعلقة بمخرجات التعليم السابقة للمهارات، لحل المشاكل العملية. 2- حل مجموعة من الأمثلة العملية من قبل المنتسبين الأكاديميين. 3- الطلب من الطلبة خلال المحاضرة بحل بعض المشاكل العملية. 4- زيارة مختبرات العملية من قبل المنتسبين الأكاديميين.

10 -طرائق التقييم
• امتحانات يومية بأسئلة بيتية. • درجات مشاركة لأسئلة منافسة تتعلق بالمادة الدراسية. • اعداد تقارير دورية عن مواضيع متعلقة بالمادة. • إعطاء الطالب مشاكل واقعية لمعرفة مدى استيعابه للمادة العلمية وربط المواضيع مع بعضها. • درجات محددة للواجبات البيتية.

11- معيار القبول
يخضع قسم الهندسة الكهربائية والالكترونية الى آلية عمل وزارة التعليم العالي والبحث العلمي – قسم القبول المركزي حيث يتم ترشيح خريجي الدراسة الإعدادية (الفرع التطبيقي) للقبول في القسم بناءا على معدلات التخرج اضافة الى ذلك يتم قبول الطلبة في الدراسة الصباحية الموازية وكذلك الدراسة المسائية. وكذلك يتم قبول بعض طلبة العشرة الاوائل من خريجي المعاهد الفنية والبعض الاخر من الخمسة بالمئة من اوائل الدراسات المهنية وبعض المتميزين من الموظفين من وزارات الدولة .

الرتبة العلمية	التخصص العام	التخصص الدقيق	المتطلبات/المهارات الخاصة (ان وجدت)	اعداد الهيئة التدريسية ملاك	اعداد الهيئة التدريسية محاضر
استاذ	هندسة كهربائية	هندسة الاتصالات		1	0
استاذ	هندسة كهربائية	هندسة الكترونيك		1	0
أستاذ مساعد	هندسة كهربائية	اتصالات		1	0
أستاذ مساعد	هندسة كهربائية	الكترونيك واتصالات		3	0
أستاذ مساعد	هندسة كهربائية	سيطرة- مياكترونيكس		1	0
أستاذ مساعد	هندسة كهربائية	الكترونيك القدرة – طاقة متجدده		1	0
أستاذ مساعد	فيزياء	ليزر		1	0
أستاذ مساعد	هندسة كهربائية	الكترونيك		1	0
مدرس	هندسة كهربائية	قدرة		4	0
مدرس	هندسة كهربائية	سيطرة		1	0
مدرس	هندسة كهربائية	الكترونيك		1	0
مدرس	هندسة كهربائية	اتصالات		1	0
مدرس مساعد	هندسة كهربائية	اتصالات، الكترونيك، قدرة		13	0
المجموع				30	0

12-التطوير المهني

- أكساب الطالب مهارات التعلم الذاتي من خلال طبيعة المفردات والمناهج الدراسة وطرق التدريس المعتمدة.
- تشجيع الطلبة على العمل كفرق عمل ضمن مشاريع عملية تعكس الواقع الحياتي للمجتمع ومشاكله.
- تشجيع الطلبة على الدخول والمشاركة في المسابقات والندوات والمؤتمرات والتي تنمي وتطور قابليته البحثية وثقته بنفسه على التعلم الذاتي.

13-أهم مصادر المعلومات عن البرنامج
1- المواقع الالكترونية للجامعات العراقية والأجنبية. 2- المكتبات العلمية. 3 - ورش العمل التي اقامتها وزارة التعليم العالي بالإضافة الى معايير الوزارة. برنامج الاعتماد الأكاديمي الأميركي.

14-خطة تطوير البرنامج
1- تحديث المناهج بما يتناسب مع سوق العمل المحلية والعالمية. 2- تحديث المختبرات العلمية لمواكبة التطور الكبير بمجال المعرفة الهندسية. 3- تغير وتحديث أساليب القاء المحاضرات العلمية. 4- الاعتماد على البرامج الهندسية الحديثة في المحاكاة. 5- ادخال الذكاء الاصطناعي في معظم المقررات الدراسية. 6- الاعتماد على منصة الالكترونية كفؤه لإدارة التعليم الالكتروني. 7- متابعة الخريجيين ومعرفة اهم التحديات التي تواجههم بسوق العمل وضع خطط استراتيجية لحلها.

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الاولى- الفصل الاول	UTQAR11	اللغة العربية	اساسي				•			•		•	•	•	•		
	UTQEN11	اللغة الإنكليزية	اساسي				•			•		•	•	•	•		
	ER 105	التفاضل والتكامل	اساسي	•	•	•		•	•	•		•	•	•	•		
	EEE 1110	دوائر كهربائية I	اساسي	•	•	•		•	•	•		•	•	•	•		
	ER 106	رسم هندسي	اساسي	•	•	•	•	•	•	•		•	•	•	•		
	ER 101	فيزياء	اساسي	•	•	•	•	•	•	•		•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الاولى- الفصل الثاني	UTQHR21	الديمقراطية وحقوق الانسان	اساسي				•			•		•	•	•	•		
	EEE 1220	فيزياء إلكترونية	اساسي	•	•	•		•	•	•		•	•	•	•		
	EEE 205	رياضيات تطبيقية	اساسي	•	•	•	•	•	•	•		•	•	•	•		
	EEE 1211	دوائر كهربائية II	اساسي	•	•	•		•	•			•	•	•	•		
	UTQCO12	علم الحاسبات	اساسي	•	•	•	•	•	•	•		•	•	•	•		
	ER 102	كيمياء	اساسي				•	•	•	•		•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الثانية - الفصل الاول	EEE 2121	الكترونيات I	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2110	مكائن تيار مستمر	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2112	دوائر كهربائية III	اساسي	•	•	•		•	•			•	•	•	•		
	ER 207	برمجة حاسبات	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2120	منطق رقمي	اساسي	•	•	•		•	•			•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الثانية- الفصل الثاني	UTQEE22	قيم تربوية	اساسي				•			•		•	•	•	•		
	EEE 2210	إشارات ونظم	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2222	الكترونيات II	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2211	مكائن تيار متناوب	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 2220	مجالات كهربائية ساكنة	اساسي	•	•	•		•	•			•	•	•	•		
	UTQCB12	جرائم حزب البعث	اساسي				•			•		•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الثالثة- الفصل الاول	EEE 3110	طرق إحتمالية	اساسي	•	•	•		•	•	•		•	•	•	•		
	EEE 3120	هندسة قدرة	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 3130	تصميم نظم رقمية	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 3140	مكائن كهربائية متقدمة	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 3121	مجالات كهرومغناطيسية	اساسي	•	•	•	•	•	•			•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الثالثة- الفصل الثاني	EEE 3210	موجات دقيقة	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 3220	نظم اتصالات	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 3230	تحليل نظم قدرة	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 3240	معالجة إشارات رقمية	اساسي	•	•	•		•	•			•	•	•	•		
	EEE 3250	نظم تحكم خطية	اساسي	•	•	•		•	•	•		•	•	•	•		

مخطط مهارات البرنامج																	
			مخرجات التعلم المطلوبة من البرنامج														
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم					
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4		
2023-2024 الرابعة- الفصل الاول	EEE 4121	نظم اتصالات رقمية	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 4151	نظم تحكم عكسية	اساسي	•	•	•	•	•	•			•	•	•	•		
	EEE 4110	معالجات دقيقة	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 4120	هوائيات وانتشار موجات	اختياري	•	•	•		•	•			•	•	•	•		
	EEE 4130	مواضيع بحثية	اساسي	•	•	•	•	•	•	•		•	•	•	•		

مخطط مهارات البرنامج																
			مخرجات التعلم المطلوبة من البرنامج													
السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	المعرفة				المهارات				القيم				
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4	
2023-2024 الرابعة- الفصل الثاني	EEE 4210	طاقات متجددة		•	•	•	•	•	•	•		•	•	•	•	
	ER 401	اخلاقيات المهنة		•	•	•	•	•	•	•		•	•	•	•	
	EEE 4220	تطبيقات متحكمات دقيقة		•	•	•		•	•	•		•	•	•	•	
	EEE 4230	إلكترونيات قدرة		•	•	•		•	•			•	•	•	•	
	EEE 4231	مشروع هندسي		•	•	•	•	•	•	•		•	•	•	•	
	EEE 4240	إدارة مشاريع					•			•		•	•	•	•	

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ARABIC LANGUAGE SKILLS مهارات اللغة العربية			**Module Delivery**	
Module Type	SUPLEMENT			**Class Lecture** **Tutorial**	
Module Code	UR 101				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	18/6/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. التعرّف على مواطن الجمال في اللّغة العربيّة وآدابها، وأن يكتسب الطالب القدرة على دراسة فروع اللّغة العربيّة. 2. تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام 3. تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين؛ كالسرعة وجودة الإلقاء وحسن التعبير. 4. تعويد الطالب التعبيرات السليمة الواضحة عن أفكاره وما يقع تحت حواسه نطقاً وكتابة وحسن استخدام علامات الترقيم 5. تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة من جميع النواحي . 6. تعويد الطلاب على قواعد الحديث واحترام الرأي الآخر وكذلك التغلب على عامل الخجل .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. الاهداف المعرفية 2. تذكر المعلومات التي درسها واستدعاؤها عند الحاجة 3. فهم المعلومات والشروح التي تفسر بعض الظواهر اللغوية والأدبية 4. تطبيق جميع ما تعلمه ودرسه الطلبة في حياتهم العملية 5. تحليل المشكلة او الموضوع الذي يتالف من اجزاء مختلفة ودراستها 6. تركيب اجزاء الجملة لمعرفة معنى كل جزء على حدة مع الاطلاع على المفاهيم الأدبية والأغراض الشعرية
Indicative Contents المحتويات الإرشادية	اللغة العربيّة أو لغة الضاد هي واحدة من أكثر اللغات انتشاراً ضمن مجموعة اللغات الساميّة، في دول الوطن العربي إضافةً للعديد من المناطق الأخرى مثل تركيّا، والأحواز، ومالي وتشاد، والسنغال، وإثيوبيا، وأريتيريا، وإيران، وجنوبي السودان. اللغة العربيّة تعتبر لغةً مقدسة على اعتبار أنها لغة القرآن، حيث لا تتم الصلاة والعبادات الأخرى في الدين الإسلامي إلا بإتقان اللغة العربيّة، كما أنها لغة شعائريّة لدى عددٍ من الكنائس المسيحيّة على امتداد الوطن العربي، وقد تمّت كتابة العديد من الأعمال الفكريّة والدينيّة اليهوديّة بها وتحديداً في العصور الوسطى. كان لانتشار الدين الإسلامي تأثيراً مباشراً وغير مباشر في رفع شأن ومكانة اللغة العربيّة، حيث أصبحت لغة العلم والأدب والسياسة لأزمنةٍ طويلة في الديار التي حكمها المسلمون، بالإضافة لهذا فقد كان للغة العربيّة تأثيرٌ كبير على عددٍ من اللغات الأخرى على امتداد العالم الإسلامي.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. إثارة اسئلة متنوعة يمكن عبرها استدعاء المعلومات 2. شرح موضوع ما عبر مصادر متنوعة ومحاولة ربط المصادر بعضها ببعض 3. مشاهدة بعض البرامج والندوات العلمية والمؤتمرات العلمية والتربوية

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Midterm Exam	1.5 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Summative assessment	100% (100 Marks)				

Learning and Teaching Resources
مصادر التعلم والتدريس

1. شرح ابن عقيل
2. معجم اللغة العربية
3. شذا العرف في فن الصرف
4. كتب الادب والشعر

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	**Ministry of Higher Education and Scientific Research - Iraq** **University of Thi-Qar** **College of Engineering** **Department of Civil Engineering**	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information **معلومات المادة الدراسية**					
Module Title	الورش الهندسية			**Module Delivery**	
Module Type	**BASIC**			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	**ER**				
ECTS Credits	**2**				
SWL (hr/sem)					
Module Level		**1**	**Semester of Delivery**		**1**
Administering Department		***Mechanical Engineering***	**College**	**Engineering**	
Module Leader	**Dr. Adnan A. Ugla**		**e-mail**	**Adnan-alomary@utq.edu.iq**	
Module Leader's Acad. Title		**Professor**	**Module Leader's Qualification**		**Ph.D.**
Module Tutor	**None**		**e-mail**	**None**	
Peer Reviewer Name			**e-mail**		
Review Committee Approval		**20/6/2023**	**Version Number**		**1.0**

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**None**	**Semester**	
Co-requisites module	**None**	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	الهدف الرئيسي هو تعريف الطلاب بالمبادئ الرئيسية للورش الهندسية وعلاقتها بالهندسة المدنية. توفر الورش الهندسية الدراسة المنهجية لعمليات التصنيع و التشغيل و اللحام و الانهاءات السطحية حيث يحتاج المهندسون المدنيون بشكل كبير إلى معرفة تلك المهارات الهندسية المهمة . المهندس المدني لابد ان يكون مطلع على جميع الاعمال الهندسية المتعلقة بقطع المعادن و تشغيلها و انهاء السطوح و الحصول على منتجات معدنية او غير معدنية بعمليات قطع المعادن المختلفة وكذل عمليات وصل المعادن.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	دراسة عمليات قطع المعادن و تشكيلها المختلفة و الفهم الجيد لخصائصها و كيفية تحسين مواصفاتها. يتمتع المهندسون المدنيون بفهم شامل لكيفية تصنيع الاجزاء الميكانيكية الحاكمة و طريقة التعامل مع مكائن قطع و تشغيل المعادن و كذلك عمليات سباكة و لحام الاجزاء المعدنية اللازمة. يتخرج العديد من الهندسيين بفهم جيد عن التعامل مع المواد المعدنية و طرق تشكيلها وقطعها و لحامها وغيرها من المهارات المهمة و التي يتعلمها في الورش الهندسية المتخصصة.		
Indicative Contents المحتويات الإرشادية	مقدمة عامة عن الورش الهندسية و المعدات و الادوات المستعملة فيها, دراسة عمليات قطع المعادن بعمليات الخرطة, دراسة انواع المكائن المستعملة في عمليات الخراطة و استعمالات كل نوع منها, اجراء تمارين عملية على الخراطة, دراسة عملية التفريز, تصنيف انواع مكائن التفريز و طرق لتفريز الشائعة, اجراء تمارين عملية عن عمليات التفريز و معرفة محاسن و مساوئ التفريز,دراسة عمليات القشط و استعمالاتها واجراء تجارب عملية عليها, دراسة عملية التنعيم السطحي و الاسطواني و طرق استمالها, دراسة عمليات اللحام الشائعة و مقارنة الانواع المستعملة و تحديد استعمالات كل نوع منها, دراسة انواع اسلاك اللحام المختلفة و تحديد الانواع المفيدة منها. اجراء تجارب عملية و اعداد تقارير عنها.		

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	الاستراتيجية الرئيسية التي سيتم تبنيها في تقديم هذه المادة هي تشجيع الطلاب على اتخاذ القرار الهندسي الصحيح داخل الموقع من خلال المعرفة الجيدة بالورش الهندسية ومدى علاقتها الكبيرة في مشاريع الهندسة المدنية في حقل العمل. سيتم تحقيق ذلك من خلال المواضيع المهمة التي تم اختيارها حيث سيتم اشراك الطلبة بالأنشطة العملية المتمثلة بالتمارين العملية و اعداد التقارير العلمية التي تخص المادة هذا سوف يؤدي الى تطوير مهارات الطلاب وتهيئتهم للواقع العملي المتقدم.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	**2**	**10% (10)**	**5, 10**	**LO #1, 2, 10 and 11**
	Assignments	**-**	**-**	**-**	**LO # 3, 4, 6 and 7**
	Projects / Lab.	**-**	**-**	**-**	
	Report	**1**	**15% (10)**	**13**	**LO # 5, 8 and 10**
Summative assessment	**Midterm Exam**	**2 hr**	**25% (10)**	**7**	**LO # 1-7**
	Final Exam	**2hr**	**50% (50)**	**16**	**All**

Total assessment	**100% (100 Marks)**		

Delivery Plan (Weekly Syllabus) **المنهاج الاسبوعي النظري**	
	Material Covered
Week 1	مقدمة عامة عن الورش الهندسية , مهام الورش الهندسية وعلاقتها بالهندسة المدنية.
Week 2	مقدمة عامة عن الورش الهندسية و المعدات و الادوات المستعملة فيها
Week 3	دراسة قطع المعادن بعملية الخرطة, دراسة انواع المكائن المستعملة في عمليات الخراطة و استعمالات كل نوع منها,
Week 4	اجراء تمارين تطبيقية على مكائن الخراطة
Week 5	دراسة قطع المعادن بعملية التفريز, دراسة انواع المكائن المستعملة في عمليات التفريز و استعمالات كل نوع منها,
Week 6	اجراء تمارين تطبيقية على مكائن التفريز
Week 7	**Mid-term Exam**
Week 8	دراسة قطع المعادن بعملية التنعيم, دراسة انواع المكائن المستعملة في عمليات التنعيم و استعمالات كل نوع منها,
Week 9	اجراء تمارين تطبيقية على مكائن التنعيم
Week 10	دراسة قطع المعادن بعملية البرادة, دراسة انواع الادوات و العدد المستعملة في عمليات البرادات
Week 11	اجراء تمارين تطبيقية في ورشة البرادة
Week 12	دراسة وصل و ربط المواد المعدنية, دراسة انواع المكائن المستعملة في عمليات اللحام و استعمالات كل نوع منها,
Week 13	اجراء تمارين تطبيقية على مكائن اللحام اليدوي و الشبه مؤتمت
Week 14	اجراء تمارين تطبيقية في عملية اللحام الغازي (الشعلة الاوكسي-اتسلينية)
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) **المنهاج الاسبوعي للمختبر**	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	

Week 5	
Week 6	
Week 7	

Learning and Teaching Resources **مصادر التعلم والتدريس**		
	Text	**Available in the Library?**
Required Texts	1- الورش الهندسية.	**yes**
Recommended Texts	كراس خاص بالورش الهندسية	**yes**
Websites		

APPENDIX:

GRADING SCHEME **مخطط الدرجات**				
Group	**Grade**	**التقدير**	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A - Excellent**	**امتياز**	**90 - 100**	**Outstanding Performance**
	B - Very Good	**جيد جدا**	**80 - 89**	**Above average with some errors**
	C - Good	**جيد**	**70 - 79**	**Sound work with notable errors**
	D - Satisfactory	**متوسط**	**60 - 69**	**Fair but with major shortcomings**
	E - Sufficient	**مقبول**	**50 - 59**	**Work meets minimum criteria**
Fail Group (0 – 49)	**FX – Fail**	**مقبول بقرار**	**(45-49)**	**More work required but credit awarded**
	F – Fail	**راسب**	**(0-44)**	**Considerable amount of work required**
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	CALCULUS	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Tutorial**	
Module Code	ER 105		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	1	**Semester of Delivery**	1
Administering Department	EEE	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Huda Anwar	**e-mail**	huda@utq.edu.iq
Peer Reviewer Name	Dr. Ahmed A. Fadhil	**e-mail**	ahmed-abd-h@utq.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

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 basic calculus tools that are needed for the engineering applications. 2. To understand different methods of integration beyond what is given in the high school. 3. This course introduces the mathematic techniques needed to deal with double and triple integrals. Furthermore, students learn their applications in calculating areas and volumes. 4. This is the basic subject for all engineering students. 5. To understand how to solve and formulate problems using polar coordinates. 6. To understand and solve triple integral in Cartesian, cylindrical, and spherical coordinates. 7. To understand line and surface integrals, Green's theorem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To make the student able to show real knowledge of mathematical concepts during the school year and their applications in different areas of engineering. 2. Learn and understand the basic definitions used in engineering mathematics such as coordinates of real values, bases and roots, equations, inequalities and graphs. 3. Learn and understand the methods of solution and time applications in integration. 4. Familiarity with the laws of finding integration by using the methods of unitary integration and using the properties of integration.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction, review, and methods of integration with applications. [15 hrs] Functions of several variables: limit, continuity, chain rules introducing vectors cross and dot products. [8 hrs] Multiple integrals: Volumes and Surface area. Integrals in general coordinate systems Line and surface integrals, Green's theorem. Polar coordinates. [20 hrs] Triple integral in Cartesian, cylindrical, and spherical coordinates. [8 hrs]

	There will be a 2-hour tutorial each week that involves problems solving and reviewing for that week's class material. [30 hr]
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (10)	5, 10	LO #1, 2, and 3
	Assignments	3	15% (10)	2, 12	LO # 1, 2, 3 and 4
	Projects / Lab.	N/A	N/A	N/A	N/A
	Report	N/A	N/A	N/A	N/A
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1, 2, and 3
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – integrals type and laws
Week 2	Methods of integration (integration by complete the square, integration of trigonometric substitutions)
Week 3	Method of integration (integration of partial fractions, integration of rational power, integration by parts, integration for odd and even powers of sine and cosine)
Week 4	Applications of integration (definite integral, area under the curve, area between curves, volume).
Week 5	Part 1 of Functions of several variables: limit and continuity.
Week 6	Part 2 of Functions of several variables: chain rules and introducing vectors cross and dot products.
Week 7	Mid-term Exam
Week 8	Multiple integrals: Volumes and Surface area
Week 9	Integrals in general coordinate systems
Week 10	Part 1 of Line and surface integrals, Green's theorem
Week 11	Part 2 of Line and surface integrals, Green's theorem
Week 12	Polar coordinates
Week 13	Part 1 of Triple integral in Cartesian, cylindrical, and spherical coordinates.
Week 14	Part 2 of Triple integral in Cartesian, cylindrical, and spherical coordinates.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	George B. Thomas, Jr., "Thomas 'Calculus", 12th edition, Addison Wesley, Pearson Education, Inc, 2010.	Yes
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Electrical and Electronic Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ELECTRICAL CIRCUIT I			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE1110				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Ayman Nasih Salman		**e-mail**	a.younis@utq.edu.iq	
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	Semester	

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 circuit theory through the application of techniques. 2. To understand how voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits subject. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. 7. Explain the principle of superposition and how it can be used to help analyze circuits. 8. Recognize Thevenin's and Norton's theorems and know how they can lead to greatly simplified circuits. 9. Explain the maximum power transfer concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law. 7. Identify the basic circuit elements and their applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Theory</u> DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining. resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis . [30 hrs] Revision problem classes [10 hrs] Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input

	resistance, output resistance, maximum power transfer [30 hrs] Revision problem classes [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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	-
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Basic Concepts
Week 2	Basics of Network Elements
Week 3	Resistance and Resistivity, Ohm's Law and Inductance, Capacitance
Week 4	Review of Kirchhoff's Laws, Circuit Analysis - Nodal and Mesh
Week 5	Circuit Analysis - Nodal and Mesh
Week 6	Linearity and Superposition, Source Transformations
Week 7	Thévenin and Norton Equivalents
Week 8	Maximum Power Transfer
Week 9	Mid-term Exam
Week 10	First-Order Circuits
Week 11	The Source-Free RC Circuit
Week 12	The Source-Free RL Circuit
Week 13	Step Response of an RC Circuit
Week 14	Step Response of an RL Circuit
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Agilent VEE and PSPICE
Week 2	Lab 2: Ohm's Law
Week 3	Lab 3: Kirchhoff's Laws
Week 4	Lab 4 Thévenin's Theorem
Week 5	Lab 5: : Norton's Theorem
Week 6	Lab 6: First-Order Transient Responses
Week 7	Lab 7: **Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Mechanical Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING DRAWING +DESCRIPTIVE ENGINEERING			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	ER 104				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Mustafa M. Mansor		**e-mail**	Mustafa.muhammedali @utq.edu.iq	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	Provide students with: An understanding of the definition, necessary backgournd and importance of the subject of Mechanical Eng. Drawing, apply the basic terminology, concepts, principles and theories of it in order to: • Be able to draw mechanical elements, • Be able to apply geometrical and dimensional tolerances, • Practice assembly drawings, • Be able to use drawing software packages for drawing both mechanical elements and assembly drawings. Skills of hand drawing of sketches.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1.Apply knowledge of mathematics, science, and engineering 2. Design a system, component, or process to meet desired needs 3. Use the techniques, skills, and modern engineering tools necessary for engineering practice
Indicative Contents المحتويات الإرشادية	• Introduction to drawing, • engineering drawing / line tools and types of lines, • engineering operations, projections, 1-Semi-straight line 2- Divide the line into a number of equal parts 3- Draw a straight line parallel to another line 4- Draw a straight line parallel to another straight line using the triangle and the letter T ruler 5- Divide the angle 6- Divide an angle into a number of equal parts 7- Draw a regular triangle given the sides 8- Draw an arc touching two straight lines 9- Draw an arc touching another arc and a straight line 10- Draw an arc that touches two other arcs 11 - Draw a regular pentagon 12 - Draw a regular hexagon 13- Divide the circle into seven equal parts 14- Divide the circle into eight equal parts

	15- Draw an ellipse using the four-center method • Truncated projections, reproduction of an unknown projection of a known projection (the third projection), • dimensioning on the projections, • Free drawing, stereoscopic drawing, reproduction of figures from projections, cutting in figures, dimensions in figures
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Skills of using a drafting package. Geometrical and dimensional tolerances. Applications on mechanical elements (bolted, welded and riveted joints, shafts and keys, springs, gears). Applications on assembly and working drawings (valves, presses etc.) Descriptive geometry and methods of projection, Projection of point, Projection of straight line, Projection plane surface, Auxiliary planes, Development, Application.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	40% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to drawing,
Week 2	engineering drawing / line tools and types of lines,
Week 3	line tools and types of lines +Descriptive geometry
Week 4	engineering operations
Week 5	engineering operations + methods of projection,
Week 6	engineering operations +Projection of point .
Week 7	Mid-term Exam+, Projection of straight line,
Week 8	projections
Week 9	projections + Projection plane surface
Week 10	Truncated projections
Week 11	reproduction of an unknown projection of a known projection (the third projection)
Week 12	dimensioning on the projections
Week 13	Free drawing, stereoscopic drawing+ Auxiliary planes, Development, Application
Week 14	reproduction of figures from projections, cutting in figures, dimensions in figures
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbooks and References • "Engineering Design Graphics", James H. Earle, AutoCAD 2004, Pearson Education Inc.	Yes

Recommended Texts	• "Engineering Drawing" with a primer on AutoCAD, Archad Noor etc. Prentice-Hall 200	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	GENERAL PHYSICS			**Module Delivery**	
Module Type	SUPPORT			**Theory Lecture**	
Module Code	ER101				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EEE		**College**		
Module Leader	AbdullhSaiwan Majli		**e-mail**	abdallah_s@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To give students an overview of topics in general physics 2. To understand an initial platform for core courses in Units and dimensions, vectors, Motion in straight line. 3. Distinct between heat and heat temperature and formulate, reflected and refracted laws 4. Making the students aware of the laws of static electricity, electric current.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. List the various terms associated with general physics. 2. provide the student with a clear and logical presentation of the basic concepts and principles of physics. 3. Describe Newton's Laws of motion, work, energy and momentum, simple harmonic motion. 4. Define Newton's Laws of motion. 5. Discuss the simple harmonic motion. 6. The student should be aware of the laws of static electricity. 7. Generic skills such as communication, tolls of solving physics problems
Indicative Contents المحتويات الإرشادية	
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	We attempt to motivate the student through examples that demonstrate the role of physics in other disciplines, including engineering, chemistry, and medicine. Lectures, discussion, Problem solving, Simulation Method Practical presentation, projects, Self-learning

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	33	**Structured SWL (h/w)**	2

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assig,nments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction; Concepts of unit and measurements, fundamental and derived units, units of length, weight, mass, time.
Week 2	Properties of Matter Dimensional Analysis, conversion of Units.
Week 3	Vectors; Coordinate Systems, Vector and Scalar Quantities, Some Properties of Vectors
Week 4	Components of a Vector and Unit Vectors Scalar Product of Vectors.
Week 5	The Force and Laws of Motion, The Concept of Force, Newton's First Law, Newton's Second Law, Mass and weight
Week 6	The Gravitational Force and Weight, Newton's Third Law, Free body diagram, Forces of Friction.
Week 7	Midterm exam
Week 8	Static Equilibrium and Elasticity, The torque, The Center of Gravity, The Rigid Object in Equilibrium, Examples,
Week 9	Work, Energy, and Power; Systems, Work Done by a Constant Force, Kinetic Energy and the Work–Kinetic Energy Theorem,
Week 10	Potential Energy, Conservation of energy, Transfer of energy, Power.
Week 11	Temperature and Heat; Temperature, Thermometers and the Celsius Temperature Scale, The Absolute Temperature Scale ,Thermal Expansion of Solids and Liquids

Week 12	Light; The Nature of Light, The Light Reflection and Refraction, The Rainbow, Fiber Optics.
Week 13	Electricity; Electric Charges, Electric Force, Electric Field, Electric potential, Capacitance, Capacitors, Dielectrics
Week 14	Magnetism; Magnetic Poles, Magnetic force, Magnetic Fields, Biot-Savart Law,
Week 15	Preparatory Week
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Physics for Scientists and Engineers, :Saunders R. A. Serway, P College Publication 2017	online
Recommended Texts		No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Electrical and Electronics Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	BASICS OF ENGLISH LANGUAGE			**Module Delivery**	
Module Type	SUPLEMENT			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	UR 102				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Sarah Rabeea Nashee		**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	Sara.rabee@utq.edu.iq	
Peer Reviewer Name	Ahmed j. Shkara		**e-mail**		
Review Committee Approval	03/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. To develop students' English language skills 2. To strengthen speaking and listening in English 3. Facilitate the learning of engineering specialization by mastering the English language to accept many educational resources related to engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develops speaking and discussion skills in English 2. The ability to form complete sentences in different tenses and to suit the dialogue time 3. Writing formal and informal letters 4. Mastering English grammar with the correct spelling of words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Parts of speech (nouns, pronouns, verbs, adverbs, prepositions, conjunctions, with learning the structure of the sentences, quiz 4 hour interjections); kinds of sentences (simple, compound, complex); subordinate clauses; 4 hour change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. 4 hour Modal verbs 2 hour prefixes and suffixes 2 hour Politely request 2 hour Conjuctions 2 hour

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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	none			
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L1
Week 2	Parts of speech (nouns, pronouns, verbs, adverbs, prepositions L2
Week 3	Interjections l1

Week 4	Interjections L2
Week 5	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L1
Week 6	change of sentences from simple to compound and vice versa; tenses; ; direct and indirect speech. L2
Week 7	Verbs
Week 8	Mid-term Exam
Week 9	Writing the essay or article l1
Week 10	Writing the essay or article l1
Week 11	Modal verbs
Week 12	prefixes and suffixes
Week 13	Politely request
Week 14	Conjunctions
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	English Grammar, Raymond murfy, 1985	No
Recommended Texts	English structure , 2020	No
Websites	https://www.examveda.com/competitive-english/practice-mcq-question-on-grammar/	

APPENDIX:

GRADING SCHEME
مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**B -** Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ELECTRONIC PHYSICS			**Module Delivery**	
Module Type	CORE			**Theory Lecture**	
Module Code	UoB12345				
ECTS Credits	6				
SWL (hr/sem)	125				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	AbdullhSaiwan Majli		**e-mail**	abdallah_s@utq.edu.iq	
Module Leader's Acad. Title	Asst.Professor		**Module Leader's Qualification**	M.sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	20/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. To give students an overview of topics in electronic physics 2. To understand an initial platform for core courses in Atomic structure and energy level, Semiconductor Materials (Si, Ge and compound semiconductors: 3. Demonstrate knowledge of history and developed characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic materials and devices. 4. Describe principles and basic concepts of electronic devices, characteristics, operations.,..
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. List the various terms associated with electronic physics. 2. provide the student with a clear and logical presentation of the basic concepts and principles of electronic. 3. Demonstrate knowledge of history and developed characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic materials and device. 4. Describe principles and basic concepts of electronic devices, characteristics, operation.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Active Lectures, discussion, Problem solving, presentation, Tutorials, Projects and Report Presentations , Self-learning

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assig,nments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction: Atomic structure and energy level,
Week 2	Electrical conduction in Metals, semiconductors and insulators, Semiconductor Materials (Si, Ge and compound semiconductors:
Week 3	Extrinsic semiconductors, fermi level in semiconductor, Diffusion and carrier,
Week 4	Extrinsic semiconductors, fermi level in semiconductor, Diffusion and carrier,
Week 5	Qualitative Theory of P-N Junction, P-N Junction as a diode, diode equation, volt- amper Characteristics.
Week 6	Temperature dependence of V-I characteristic, ideal versus practical diode,
Week 7	Midterm exam
Week 8	Resistance levels (static and dynamic), transition and diffusion capacitances, diode equivalent circuits
Week 9	load line analysis, breakdown mechanisms in semiconductor diodes
Week 10	Diode Circuit Applications, Rectifiers, Zener diode voltage regulator
Week 11	Clipping circuits, clamping circuits وMultiplier voltage, filters and smoothing circuits
Week 12	Types of semiconductor Diode, photo diode, Light emitting diode, varactor diode, tunnel diode
Week 13	Solar cells, Schottky diode, s PIN diode, Shockley Diode
Week 14	
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**1-**Robert L. Boylestad, and Louis Nashelsky, "Electronic Devices and Circuit Theory", **2-**Thomas L. Floyd, "Electronic Devices: Conventional Current Version ",eighth edition,	online
Recommended Texts		No
Websites	http://www.pearsoned.co.uk/ http://www.ocw.mit.edu/courses	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	APPLIED MATHEMATICS	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Tutorial**	
Module Code	ER 205		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	1	**Semester of Delivery**	1
Administering Department	EEE	**College**	Engineering
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Huda Anwar	**e-mail**	huda@utq.edu.iq
Peer Reviewer Name	Dr. Ahmed A. Fadhil	**e-mail**	ahmed-abd-h@utq.edu.iq
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ER105	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop problem solving skills and understanding of basic differential equations and linear algebraic tools that are needed for the engineering applications. 2. To understand different methods of solving differential equations beyond what is given in the high school. 3. This course introduces the mathematic techniques needed to deal with engineering systems with a focus on the students' majors through choosing the differential and linear systems appropriate models 4. This is a basic subject for most engineering students and in particular in electrical, biomedical, and mechanical engineering. 5. To understand how to solve and formulate physical problems using differential equations and basic linear algebraic skills. 6. To understand and solve basic partial differential equations. 7. To understand and solve simple nonlinear systems. 8. To have the intuition of the meaning of a linear system of equations and how to solve different types of these systems. 9. To understand and apply some common concepts between linear algebra and differential equations through solving the eigenvalue problem.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To introduce students to specific and major oriented mathematical knowledge to apply concepts learned from ER105 and ER205 to solve more mathematically involved engineering problems. 2. Learn and understand the basic definitions used in solving linear systems of equations. 3. Learn and understand the basic definitions used in solving linear systems of equations and systems of differential equations through solving the eigenvalue problem. 4. Learn and understand the basic definitions used in ordinary linear differential equations. 5. Learn and understand the basic definitions used in ordinary nonlinear differential equations. 6. Learn and understand the basic definitions used in partial differential equations.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part 1 – Introduction to Linear Algebra Introduction to linear systems of equations and how to solve them. Solution sets of linear systems. Linear Independence. Matrix operations, eigenvalues and eigenvectors. [16 hrs] Part 2 – Introduction to Differential Equations First order differential equations and their solution methods. [8 hrs] Second and higher order differential equations and their solution methods. [8 hrs] Laplace transform and its role in solving differential equations. [8 hrs] Systems of linear and nonlinear differential equations. [6 hrs] Introductory partial differential equations. [8 hrs] There will be a 2-hour tutorial each week that involves problems solving and reviewing for that week's class material. [30 hr]
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Part 1:** Introduction to linear systems of equations and how to solve them. Solution sets of linear systems. Linear Independence.
Week 2	Matrix operations, matrix inverse, and characterization of invertible matrices.
Week 3	Subspaces and rank.
Week 4	Eigenvalues and eigenvectors with major specific application.
Week 5	**Part 2:** First order ordinary linear differential equations: Separation of variables, linear equations, exact equations, and solutions by substitutions.
Week 6	Continuing the discussion of first ODEs.
Week 7	Mid-term Exam
Week 8	Second and higher order ordinary linear differential equations: Reduction of order, homogeneous linear equations with constant parameters, and underdetermined coefficients.
Week 9	Second and higher order ordinary linear differential equations: variation of parameters, and Cauchy-Euler equations. Introduction if time permits to Laplace transform.
Week 10	Solving differential equations using the Laplace transform
Week 11	Solving a system of differential equations using the Laplace transform and eigenvalues
Week 12	Introducing some simple nonlinear differential equations and systems of nonlinear differential equations
Week 13	Partial differential equations: Introduction and the heat equation.

Week 14	Partial differential equations: The wave equation and if time permits giving the solution of nonhomogeneous partial differential equations.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. D.Lay, S. Lay, and J. McDonald, Linear Algebra and Its Applications, 5th Edition. 2. D. Zill, Advanced Engineering Mathematics, 6th Edition.	Yes
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Electrical and Electronic Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ELECTRICAL CIRCUIT II			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE1211				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Dr. Ayman Nasih Salman		**e-mail**	a.younis@utq.edu.iq	
Module Leader's Acad. Title	lecture		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval			**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	

Co-requisites module	None	**Semester**	

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 circuit theory through the application of techniques. 2. To understand the phasor relationships for circuit elements. 3. This course deals with the basic concept of A.C electrical circuits. 4. This is the basic subject for all electrical and electronic circuits subject. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To understand the maximum power transfer concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how electricity works in A.C electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Identify the basic circuit elements and their applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - Circuit Theory</u> AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [30 hrs] Revision problem classes [10 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. Magnetically Coupled Circuits [30 hrs] RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor [30 hrs] Revision problem classes [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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	-
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, and 4
	Assignments	2	10% (10)	2, 12	LO # 3, 4, and 5
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 2, 3 and 5
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Basic Concepts
Week 2	Sinusoidal Forcing, Complex Forcing, Phasors, and Complex Impedance,
Week 3	Sinusoidal Steady State Response

Week 4	Average Power, RMS, Introduction to Polyphase Circuits
Week 5	Mutual Inductance
Week 6	Linear and Ideal Transformers
Week 7	Circuits with Mutual Inductance
Week 8	Mid-term Exam
Week 9	Frequency Response of Series
Week 10	Frequency Response of Parallel Resonances, High-Q Circuits
Week 11	Complex Frequency, s-Plane, Poles and Zeros, Response Function,
Week 12	Passive Filter
Week 13	Two Port Networks, Admittance, Impedance
Week 14	Two Port Networks ,Hybrid, and Transmittance Parameters
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to AC circuit
Week 2	Lab 2: Transformers1
Week 3	Lab 3: Transformers2
Week 4	Lab 4: Frequency Response of series RLC Circuits
Week 5	Lab 5: Frequency Response of parallel RLC Circuits
Week 6	Lab 6: Frequency Response of passive filter
Week 7	Lab 7: **Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes

Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	COMPUTER SCIENCE	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Lab** **Tutorial**	
Module Code	ER107		
ECTS Credits	4		
SWL (hr/sem)	200		
Module Level	1	**Semester of Delivery**	2
Administering Department	EEE	**College**	ER
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand how computers work. 2. To understand, through the use of MATLAB, how to program a computer to solve problems in engineering and sciences. 3. This course teaches the basic concepts of computations. 4. This course introduces students to the fundamental coding algorithms that are part of all branches of engineering and sciences.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An understanding of how computers work and what is needed to formulate a problem and solve it with computers. At this stage, students learn how to define sets of variables and apply some simple conditional statements. 2. An understanding of the fundamentals of programming using MATLAB and employ loops to repeat operations a desired amount of times. Define the different types of loops and describe their uses. 3. Create functions that operate on a universal level and describe the advantages of user-defined functions. 4. Create more complex, modularized programs with multiple user-created functions and use some tools that are specific to the MATLAB programming. 5. An understanding of the broad usefulness of computer programming through solving different engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Basic Generic Coding Concepts</u> This material is covered in the first six weeks of the class. The material is general enough such that it introduces students to the general theme of coding which is not specific to MATLAB coding style. The material includes basic data representation in computers, conditional statements and simple loops. [12 hrs] <u>Part B – Advanced MATLAB Coding Concepts</u> The material in the second part of the class deals with specific MATLAB coding concepts and features. In other words, it introduces students and gives them the ability to use in a hybrid mode the basic coding skills that are learned in the first part of the class and the MATLAB package capabilities to build more sophisticated and problem oriented chunks of codes as well as visualizing the data. [14 hrs] Note that there is a 2-hour lab each week with a lab-assignment that

	students have to complete by the next lab meeting to enhance and enforce students' understanding to the material given in the class.

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.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	10	20% (10)	2-6, 8-12	All
	Projects / Lab.	10	10% (10)	Continuous	All
	Report	N/A	N/A	N/A	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO#1,2, and 3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Computers and How They Represent Data
Week 2	Logic, Math, Functions, and Comments in MATLAB

Week 3	Conditional Statements
Week 4	Arrays and Loops
Week 5	Debugging and Introduction to GUI
Week 6	Matrices and Nested Loops
Week 7	Mid-term Exam
Week 8	Audio, Images, and Reading Data
Week 9	Matrix Math
Week 10	Plotting
Week 11	More on GUIs
Week 12	Modular Programming, Making bigger programs
Week 13	Cell Arrays
Week 14	Structures
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Holly Moore, "MATLAB for Engineers", 4th Edition	Online
Recommended Texts		
Websites	1. https://www.mathworks.com/ 2.https://coursera.org/specializations/matlab-programming-engineers-scientists	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Chemistry**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ER101**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Petroleum and Gas engineering	**College**	Collage of Engineering	
Module Leader	Name Ahmed Majeed Daife		**e-mail**	E-mail: ahmed.alketife@utq.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		13/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To acquire a reasonable level of knowledge in chemical in accordance with what is given among the different universities around the world, especially the high ranked ones. 2. To understanding of the basic topics in chemistry and its applications in the field of laboratories with knowledge Appropriate on different chemistry axes. 3. To gain good knowledge of the fields of using chemical methods in different fields of knowledge and the ability to diagnosis of the problems he faces and how to address them in order to be qualified to work in the industries of society. 4. Outstanding students are eligible to complete their higher studies inside and outside the country and to be high qualified Engineer. The objective of the course is to strengthen the level scientific for students on the principles of chemistry.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how use chemical concentrations to work with chemicals. 2. List the various methods of measuring chemical concentrations. 3. Summarize what is meaning of mole, molar mass, calculations in garms and mole. 4. Define solution preparation, molarity, normality, formality, PH, POH, solubility. 5. Chemical equilibrium and chemical equations. 6. Explain the introduction about acids and based, and buffers solution. 7. Acid-base reactions equilibrium 8. Analytical methods: qualitative analysis. 9. Analytical methods: Titration. 10. Forward titration. 11. backward titration. 12. Complex titration using ETDA.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Introduction to chemistry and measuring methods</u> This chapter a details deception and introduction will be provided about the different kinds of available breached of chemistry sciences and the field that Petroleum and Gas Engineering are focused on and why? The available measuring methods of concertation used in the chemistry will be given and discussed in details including some relevant information about the importance of these measurements in oil and gas engineering. [10hrs]

	Mole and Molar mass –mass mole causations for elements and substances; Mole measurement calculation, using different methods for liquid and solid [10hrs] Molarity – Define the other methods of measuring the concentration, including molarity and normality and identify the relation between them, knowing how to measure PH and POH. [10 hrs] Chemical Equations – types of chemical equation; chemical stoichiometric, chemical equation equilibrium. [10hrs] Revision problem classes [6 hrs] <u>Part B Acid base</u> Acid –Base – equilibrium and buffers solution, specification of buffer solution, the calculations of acid based solutions; equivalent point [10 hrs] Titration: An introduction to titration; tools; phenomena; applciations . [7 hrs] Types of titrations: Backwards; forward; and complex [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 types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	21	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Definitions and fundamental concepts
Week 2	Concretions of solutions
Week 3	Dilution Law, normality and molarity calculation
Week 4	Acid-Base Equilibrium
Week 5	Buffers Solutions
Week 6	Volumetric analysis
Week 7	Mid-term Exam + Quiz day
Week 8	Titration
Week 9	End Points and Equivalent Point
Week 10	Forward Titration
Week 11	Backward Titration
Week 12	Complex Titration using EDTA
Week 13	Presentation Students Day
Week 14	Seminar Day
Week 15	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to chemical concertation calculation: Solubility.
Week 2	Lab 2: Acid – Based equilibrium
Week 3	Lab 3: volumetric analysis and Titration
Week 4	Lab 4: Buffer solutions
Week 5	Lab 5: Forward Titration
Week 6	Lab 6: Backward Titration
Week 7	Lab 7: Complex Titration

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	[1] Analytical_Chemistry_7e_by_Gary_D._Chris	Yes
Recommended Texts	[2] Fundamentals_of_Analytical_Chemistry_Ed Copyright Year: 2020, dissidents.	No
Websites	[3] Harris_-_Quantitative_Chemical_Analysis_-_8th_edition	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ELECTRONICS I			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial**	
Module Code	EEE 2121				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	2		**Semester of Delivery**	3	
Administering Department	EEE		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 1220, EEE 1211	**Semester**	2
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The objective of this course is to teach operation and application of the basic electronic elements like diodes and transistors, DC and AC analysis of BJT and FET amplifiers, to make students understand the basics of operational amplifiers, oscillators and power amplifiers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- To understand the operation and application of diode. 2- To understand the operation of BJT and perform AC/DC analysis 3- To understand the operation of FET and perform small signal analysis. 4- To design transistor amplifiers (BJT or FET) for the given gain, input-output impedance and frequency response specifications.
Indicative Contents المحتويات الإرشادية	-Basic semiconductor concepts, current flow in semiconductors, physical structure and operation of PN junction. –Terminal characteristics of ideal and junction diodes, diode circuits, diode modeling of forward characteristics, Zener diode, diode application-rectifiers, clamping, clipping, voltage regulation, Schottky-Barrier diode, photodiodes, light emitting diode (LED) – Physical structure and operation of BJT, current-voltage characteristics of NPN BJT and PNP BJT, BJT circuit DC analysis, small-signal operation and models (CE, CB, CC), discrete BJT amplifier – Analog concept, transistor amplifier, single-stage and multi-stage amplifiers.
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.

Student Workload (SWL)

الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 6	LO #2, and 4
	Assignments	2	10% (10)	4, 12	LO # 2, and 4
	Projects / Lab.	2	10% (10)	Continuous	
	Report	0	10% (0)		
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Semiconductor diodes, P-N junctions, diode characteristics, the ideal-diode Model, the small-signal model, Zener diodes.
Week 2	Diode applications (rectifiers, clippers, clampers, voltage multipliers, Zener voltage regulators)
Week 3	Bipolar junction transistor (BJT) and its characteristics, DC biasing of BJTs.
Week 4	DC biasing of BJTs
Week 5	DC biasing of BJTs
Week 6	AC analysis of BJTs
Week 7	AC analysis of BJTs
Week 8	Midterm exam
Week 9	Field effect transistor (FET), FET types and their characteristics.
Week 10	DC biasing of FETs.

Week 11	DC biasing of FETs.
Week 12	FET Amplifiers
Week 13	FET Amplifiers
Week 14	Analysis of multi- stage BJT and FET multi-stage amplifiers, Input impedance, output impedance and gain calculations of multi-stage amplifiers.
Week 15	Analysis of internal circuits of Op-Amp.
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	Diode I-V characteristics (Ge +Si)
Week 3,4	Clipping & clamping circuits
Week 5,6	Zener diode characteristics and circuits as regulation.
Week 7,8	Input and output characteristics of BJT in CEC
Week 9,10	CEC -based Amplifier for mall signal
Week 11,12	Frequency response of small signal amplifier.
Week 13,14	FET characteristics and using as Amplifier and switch.
Week 15,16	Operational amplifier 741IC circuits and final exam.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Sedra, A. Smith, K. C., "Microelectronic circuits", 8th edition 2003.	Yes
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	DC MACHINE	**Module Delivery**	
Module Type	CORE	✓ Theory ✓ **Lecture** ✓ **Lab** ✓ **Tutorial** **Practical** **Seminar**	
Module Code	EEE2110		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	UGII	**Semester of Delivery**	4
Administering Department	Electrical & Electronics Dept	**College**	College of Engineering
Module Leader	Dr. Waleed J. Hassan	**e-mail**	Waleedd-j@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	30/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**EEE 1211**	**Semester**	2

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	This course studies the fundamental principle, the physical construction, mathematical model and calculations, and practical implementations of magnetic circuits and DC machines by studying and understanding different types of DC generators and motors, their construction, operation, and applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will be able identify different types of magnetic circuits 2. Students will be able explain the importance of magnetic materials in design and operation of different applications 3. Students will be able to analyse different types of magnetic circuits 4. Students will be able to identify different parts of a DC machine & understand its operation. 5. Students will be able to explain the various losses in DC machines and their efficiency. 6. Students will be able to analyse different types of DC generators their characteristics, industrial applications, effect of armature reaction and its assessment. 7. Students will be able to explain the principle of DC motor, electrical characteristics and industrial application. 8. Students will be able to understand different excitation and starting methods of DC machines. 9. Students will be able to develop the speed control of a DC motor
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part I: - Magnetic circuits Magnetic field and its significance, magnetic circuit and its analysis, series magnetic circuits, parallel magnetic circuits, magnetisation or b-h curve, magnetic hysteresis, and residual magnetism and retentivity. Part II: - D.C. Generators Construction of D.C. machines, types of D.C. machines, working principle of D.C. generators, EMF equation of DC generator, Lap and Wave windings, armature reaction in D.C. generators, commutation, and methods of improving Commutation, characteristics of D.C. Generators, separately excited DC generator, voltage build-up in self-excited generator, D.C. shunt, D.C. series and D.C. compound generator characteristics, power flow in D.C. generator,

	losses and efficiency in D.C. generator and their examples. Part III: - D.C. Motors Overview of construction, working principle of the motor, back E.M.F and its equations, types of DC motors, torque of DC motor, armature reaction in DC motor, characteristics of a DC shunt motor, characteristics of a DC series motor, characteristics of a DC compound motor, need of DC motor starter, starting of DC motors, three points and four Points starter with its advantages and disadvantages, speed of a DC machine, speed control of DC motors, losses in DC machines, and power flow diagram.
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

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

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Magnetic field and its significance, magnetic circuit and its analysis, series magnetic circuits
Week 2	parallel magnetic circuits, magnetisation or b-h curve, magnetic hysteresis, and residual magnetism and retentivity.
Week 3	Construction of D.C. machines, types of D.C. machines, working principle of D.C. generators. EMF equation of DC generator, Lap and Wave windings.
Week 4	Armature reaction in D.C. generators, commutation, and methods of improving Commutation
Week 5	Characteristics of D.C. Generators, separately excited DC generator. Voltage build-up in D.C. shunt self-excited generator
Week 6	voltage build-up in D.C. series and D.C. compound generator characteristics
Week 7	Power flow in D.C. generator, losses and efficiency in D.C. generator and their examples.
Week 8	Overview of construction, working principle of a DC motor, back E.M.F and its equation.
Week 9	Types of DC motors, torque of DC motor, armature reaction in DC motor.
Week 10	Characteristics of a DC shunt motor, characteristics of a DC series motor.
Week 11	Characteristics of a DC compound motor, need of DC motor starter, starting of DC motors.
Week 12	Three points and four Points starter with its advantages and disadvantages.
Week 13	Losses in DC machines, and power flow diagram.
Week 14	Speed control of DC motors.
Week 15	Preparatory Week
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Operation of the Separately Excited DC Shunt Generator
Week 2	Lab2: Loaded Operation of the Separately Excited DC Shunt Generator
Week 3	Lab 3: No-Load operation of the self-excited DC shunt generator
Week 4	Lab 4: Loaded Operation of the Self Excited DC Shunt Generator

Week 5	Lab 5: Loaded Operation of the DC Series Generator
Week 6	Lab 6: No-Load Operation of the DC Compound Generator
Week 7	Lab 7: Loaded Operation of the DC Compound Generator
Week 8	Lab 8: Starting, speed control and direction change of the dc shunt motor
Week 9	Lab 9: No-load speed characteristic of the DC shunt motor
Week 10	Lab 9: loaded speed characteristic of the DC shunt motor
Week11	Lab 11: loaded speed characteristic of the DC series motor
Week12	Lab 12: No-load speed characteristic of the DC Compound motor
Week13	Lab 13: Preparatory Week
Week14	Lab 14: Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Electrical Technology Part - II by B. L. Theraja, S. Chand Publication 2. Electrical Machines by M. V. Deshpande, PHI Learning	Yes
Recommended Texts	1. Electrical Machines by Ashfaq Hussain, Dhanpat Rai and Co. 2. Electrical Technology by S. L. Uppal, Khanna Publication 3. Electric Machinery by E. Fitzgerald and C. Kingsley, McGraw HillEducation 4. Electric Machines by I. J. Nagrath and D. P. Kothari, McGraw Hill Education 5. Theory and Performance of Electrical Machines by J. B. Gupta, Katson Publication 6. Performance and Design of A.C. Machines by M. G. Say, CBS Publishers 7. Electrical Machinery by P. S. Bhimbhra, Khanna Publishers	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings

	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electrical Circuits III			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEE 2112				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	3	
Administering Department	EEE		**College**	ENG	
Module Leader	Hussein Nasser Wazeer		**e-mail**	Hussein-n@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 1211	**Semester**	2
Co-requisites module	EEE 1110	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the phase vectors of single- and three-phase circuits and how to use them in the analysis of electrical circuits. 2. Understand the idea of magnetically connected circuits as an introduction to understanding the work of ideal and non-ideal transformers. 3. Knowing the effect of sources with variable frequencies on the performance and response of electrical circuits. 4. Learn how to represent circuits in advanced ways to facilitate their analysis, such as the method of implementers or using the Laplace transform. 5. Identify the process amplifier and how to use it in designing various circuits such as effective filters, isolation circuits and amplifiers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify single and three-phase systems analysis and power calculation). 2. Learn about magnetically linked networks. 3. Calculation of mutual inductors and their incorporation in ideal and linear transformers. 4. Identify electrical circuits with variable frequencies and analyze the response to those circuits. 5. Study of resonant circuits, filter networks, and Bode diagrams. 6. Study of two-port networks. 7. Learn how to calculate parameter types (passive, impedance, transition and hybrid) for 2-port circuits. 8. Learn how to convert between the parameter types mentioned in the previous point. 9. Identifying the Laplace transform and its applications within the analysis of electrical circuits. 10. Learn how to represent and analyze electrical circuits within the frequency space using the Laplace transform. 11. Study of the operational amplifier and its various circuits and its applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. PART (A): Single phase systems Single phase systems analysis theories and their power calculation, phasor analysis, complex power, power factor and power factor correction, and maximum power transfer. Magnetically coupled networks, mutual inductance, energy analysis, ideal and linear transformers.

	Variable frequency network performance, variable frequency response analysis, resonance circuits, filter networks, Bode plots. Two port networks, (admittance, impedance, hybrid, and transmission parameters, conversions among different parameters types. The Laplace transform and its application, definition, singularity functions, transform pairs and properties, inverse Laplace, circuit elements, analysis and synthesis techniques. –Operational amplifiers PART (A): Three phase systems Three phase system analysis and phasor diagrams, Star-Delta connections, power in three phase systems, overall power factor, transmission efficiency.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In class lectures, online lectures, tutorials, discussions and solving problems related to the curriculum, brain storming problems.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (15)	5, 10	LO #1, 2, 10, and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, and 9
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 9 and 11
Summative assessment	Midterm Exam	2 hr	15% (15)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Three phase systems
Week 2	Three phase power systems analysis
Week 3	Magnetically coupled networks
Week 4	Mutual inductance, energy analysis, and ideal transformer
Week 5	Variable frequency network performance
Week 6	variable frequency response analysis
Week 7	Mid-Term Exam, Resonance circuits
Week 8	Filter networks
Week 9	Bode plots
Week 10	Two port networks
Week 11	Admittance, impedance, hybrid, and transmission parameters
Week 12	Conversions among parameters
Week 13	The Laplace transform and its application
Week 14	Operational amplifiers
Week 15	Preparatory week before the final Exam
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	Electrical Circuits Analysis, William H.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	COMPUTER PROGRAMMING	**Module Delivery**	
Module Type	BASIC	**Theory** **Lecture** **Lab** **Tutorial**	
RModule Code	ER207		
ECTS Credits	4		
SWL (hr/sem)	200		

Module Level	2	**Semester of Delivery**	1
Administering Department	EEE	**College**	ER
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	ER107
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the fundamentals of object oriented programming and C++. 2. Emphasis on numerical computing. 3. This course basic program structure and C++ syntax (loops, functions, arrays, pointers). 4. More advance programming concepts such as object oriented concepts and data structures (abstract data types, classes, overloading, inheritance, linked lists, stacks, queues, trees) with a focus on mathematical functions, numerical methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Broadening the students' programming understanding of how computers work through the study of C++ which is a technical programming language that requires higher and more challenging coding abilities. 2. An understanding of the fundamentals of object oriented programming using C++ and employ loops to repeat operations a desired amount of times. 3. Create functions that operate on a universal level and describe the advantages of user-defined functions. 4. Create more complex, modularized programs with multiple user-created functions and use some tools that are specific to C++ programming environment. 5. An understanding of the broad usefulness of computer programming through solving different engineering problems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Basic C++ Coding Concepts</u> This material is covered in the first six weeks of the class. The material is coding specific to C++ coding style. The material includes basic data representation in C++, conditional statements and simple loops. [12 hrs] <u>Part B – Advanced MATLAB Coding Concepts</u> The material in the second part of the class deals more advanced C++ coding concepts and features. It introduces students and gives them the ability to use the salient features of C++ such as pointers and classes to build more sophisticated and problem oriented chunks of codes as well as visualizing the data. [14 hrs] Note that there is a 2-hour lab each week with a lab-assignment that students have to complete by the next lab meeting to enhance and enforce students' understanding to the material given in the class.

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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	All
	Assignments	10	20% (10)	2-6, 8-12	All
	Projects / Lab.	10	10% (10)	Continuous	All
	Report	N/A	N/A	N/A	
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO#1,2, and 3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to C++ and its Data Types
Week 2	C++ Conditional Statements
Week 3	Arrays
Week 4	Functions
Week 5	Loops
Week 6	Multi-dimensional Arrays/Sorting and Search
Week 7	Mid-term Exam
Week 8	Pointers
Week 9	Recursion
Week 10	Classes
Week 11	Operator Overloading
Week 12	Inheritance, Polymorphism, and Templates
Week 13	Data Structures and Introduction to Standard Data Template Library
Week 14	Quick Sorts and Heaps
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Deitel and Deitel , "How to Program in C++", 9th (or any) Edition	Online
Recommended Texts		
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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Note:

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ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research - Iraq
University of Thi-Qar
College of Engineering
Department of Electrical and Electronics Engineering

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	DIGITAL LOGIC منطق رقمي	**Module Delivery**	
Module Type	CORE	✓ Theory ✓ **Lecture** ✓ **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE2120		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	2	**Semester of Delivery**	3
Administering Department	EEE dept	**College**	College of Engineering
Module Leader	M.Sc. Rawaa Kadhim	**e-mail**	Rawaa.kadhim@utq.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	Master's
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.Amean Al-Safi	**e-mail**	Amean.alsafi@utq.edu.iq
Review Committee Approval	20/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Understand the type of number systems (decimal, binary, hexadecimal and octal) and how to convert between numbering systems. 2. Understand the arithmetic operations on the number systems. 3. An ability to describe and representation the coding system (BCD-8421, 2421 – code, Gray Code and Excess-3 Code). 4. Understand how to express signed binary numbers (sign-magnitude, 1's complement, 2's complement) and arithmetic operations with signed binary numbers. 5. An ability to describe the operation and construct truth tables for the Basic Logic Gates (Not, OR, AND, NAND, NOR, X-OR and XNOR gate). 6. Understand the Basic rules of Boolean algebra to simplify Boolean expressions. 7. Understand how to simplify Boolean expressions using Karnaugh Map. 8. An ability to use Boolean algebra and the Karnaugh map as tools to simplify and design to several types of combinational Logic Circuit (adders, comparators, decoders, encoders, code converters, multiplexers and demultiplexers). 9. An ability to understand the Combinational Logic Circuit and Sequential Logic circuit. 10. An ability to use logic gates to construct the Sequential Logic circuit (S-R latch, D flip-flops and J-K flip-flops). 11. Understand the difference between the operations of registers and counters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student understands the basic principles of number systems. 2. The student learns how to deal with simplifying the Boolean expressions using Boolean algebra and Karnaugh Map. 3. The student learns how to deal with designing the digital logic circuits. 4. The student understands the basic concept and applications of combinational logic circuit. 5. The student learns how to deal with implementing and designing the several types of combinational logic circuit. 6. The student understands the basic concept and applications of sequential logic circuit.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part I: Basic Number Systems: -In this part, the binary number system and its relationship to other number systems such as decimal, hexadecimal, and octal are presented. Arithmetic operations with binary numbers are covered to provide a basis for understanding how computers and many other types of digital systems work. Also, digital codes

	such as binary coded decimal (BCD), the Gray code, and Excess-3 code are covered. -Numbers Signed and Arithmetic Operations with Signed Numbers: There are three forms in which signed integer numbers can be represented in binary: sign-magnitude, 1's complement, and 2's complement. Of these, the 2's complement is the most important and the sign-magnitude is the least used and then learning how signed numbers are added and subtracted. Part II: Logic Gates and Boolean algebra: The emphasis in this part is on the operation and application of logic gates (Not, OR, AND, NAND, NOR, X-OR and XNOR gate). The relationship of input and output waveforms of a gate using timing diagrams is thoroughly covered. Also covers the laws, rules, and theorems of Boolean algebra and their application to digital circuits. You will learn how to define a given circuit with a Boolean expression and then learn how to simplify logic circuits using the methods of Boolean algebra and Karnaugh map. Part III: Combinational Logic Circuit: In this part , several types of combinational logic functions are introduced including Half-Adder, Full-Adders, Parallel Binary Adders, 4-bit parallel adder, Half and Full subtractor, Adder –Subtractor, Binary-Code- Decimal (BCD) Adder, Binary Multipler, Magnitude Comparators and Code conversion, decoders, encoders, code converters, multiplexers and demultiplexers. Part IIII: Sequential Logic Circuit: In this part, a study of the fundamentals of sequential logic circuit (S-R Latch, D Latch, D Flip-flop, J K Flip- Flop and T Flip-Flop). Also study of the applications of Flip–Flop.
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4, 8	LO #1 ,2 and 3
	Assignments	2	10% (10)	6, 12	LO # 3, 4 ,5 and 6
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO #3, 4 and 5
Summative assessment	Midterm Exam	2 hr	10% (10)	11	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic Number Systems : Type of Number Systems(decimal, binary, hexadecimal and octal), Conversion Between Number Systems and Arithmetic operations on Number Systems
Week 2	Basic Number Systems: Coding system (BCD-8421, 2421 – code, Gray Code and Excess-3 Code), Signed Numbers (sign-magnitude, 1's complement, 2's complement) and Arithmetic operation with Signed Numbers
Week 3	Logic Gates and Boolean algebra: Basic Logic Gates (Not , OR, AND, NAND, NOR, X-OR and XNOR gate), Basic rules of Boolean algebra, DeMorgan's Theorems and Boolean Expression for a Logic Circuit.
Week 4	Logic Gates and Boolean algebra: Universal Property of NAND and NOR Gates, The Sum-of-Products (SOP) Form, and The Product-of-Sums (POS) Form.
Week 5	Logic Gates and Boolean algebra: Simplification of Boolean Expression (B.E) using Karnaugh map, Karnaugh map with Don't Care" Conditions and Karnaugh map POS minimization.
Week 6	Combinational Logic Circuit: Half-Adder, Full-Adders, Parallel Binary Adders, 4-bit parallel adder, Half and Full subtractor and Adder –Subtractor.
Week 7	Combinational Logic Circuit: Binary-Code- Decimal (BCD) Adder, Binary Multipler, Magnitude Comparators and Code conversion.
Week 8	Combinational Logic Circuit: Decoders (2x4, 3x8 and 4x16 decoder), and Decoder With Enabel. Combinational Logic Implementation with Decoder.
Week 9	Combinational Logic Circuit: BCD to 7-Segment Decoder and Encoders (4x2, 8x3 and 16x4 encoder).
Week 10	Combinational Logic Circuit: Multiplexer (2x1, 4x1, 8x1 and 16x1 MUX) and Demultiplexers.
Week 11	Mid-term Exam + Sequential Logic Circuit: S-R Latch, D Latch, D Flip-flop, J K Flip- Flop and T Flip-Flop.
Week 12	Sequential Logic Circuit: Master-Slave D Flip-Flop, Asynchronous Preset and Clear Inputs, Parallel Data Storage, Level-Sensitive versus Edge-Triggered Storage Elements and

	Frequency Division.
Week 13	Counter and Shift registers
Week 14	Synchronous sequential circuit analysis and synthesis, Synchronous logic design with state machines, the ASM method, state machine models
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Logic Gates and Operation
Week 2	Lab 2: Binary to Gray and Gray to Binary Cod Conversion
Week 3	Lab 3: BCD to Excess-3 Cod Conversion
Week 4	Lab 4: Boolean laws and De-Morgan's Theorems
Week 5	Lab 5: Decoder and Encoder
Week 6	Lab 6: Multiplexer and De_Multiplexer
Week 7	Lab 7: Up and Down counter
Week 8	Lab 8: Flip- Flop

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-"Digital Fundamentals " Thomas L. Floyd	Yes
Recommended Texts	1-"Digital Design" M. Morris Mano. 2- "Digital Principles and Application" Albert Paul Malvino	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Electrical and Electronics Engineering Department	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	TECHNICAL ENGLISH	**Module Delivery**	
Module Type	SUPLEMENT	**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	UR 301		
ECTS Credits	2		
SWL (hr/sem)	50		

Module Level	3	**Semester of Delivery**	6
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Sarah Rabeea Nashee	**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	Sara.rabee@utq.edu.iq
Peer Reviewer Name	Ahmed j. Shkara	**e-mail**	
Review Committee Approval	03/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To develop students' English language skills 2. To strengthen speaking and listening in English 3. Facilitate the learning of engineering specialization by mastering the English language to accept many educational resources related to engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Develops speaking and discussion skills in English 2. The ability to form complete sentences in different tenses and to suit the dialogue time 3. Writing formal and informal letters 4. Mastering English grammar with the correct spelling of words
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Tenses The first part is the tenses and the grammar of the tenses How to build sentences in all tenses in accordance with the rules of the English language for each tense 6 hours Writing the essay or article Its purpose is to learn to write a composition according to the formulas given and the rules of the English language With a daily exam 4 hours Voices Learn to pronounce English words and the rules followed for pronunciation with a daily exam 4 hours The questions Study the structure of the affirmative sentence through the affirmative question With daily exam and homework 2 hours Question tag A detailed lecture on all interrogative tools, interrogative methods, and how to formulate an interrogative sentence 2 hours

	The passive and the active voices How to convert between the two sentences according to five rules With homework in two stages The first is to give a sentence for each rule, and the second is to transfer the sentences given as homework from the active voice to the passive voice 4 hours
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	102	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	98	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	none			
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	The tenses (present and past simple tense and future) L1
Week 2	The tenses (perfect tenses (present an past perfect tens) L2
Week 3	Present continuous tense L3
Week 4	Writing the essay or article L1
Week 5	Writing the essay or article l2
Week 6	Voices L1
Week 7	Voices L2
Week 8	Mid-term Exam
Week 9	The equations
Week 10	Question tag
Week 11	Active voice
Week 12	Passive voice
Week 13	The introducing L1
Week 14	The introducing L2
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	English Grammar, Raymond murfy, 1985	no
Recommended Texts	English structure 2020, dissidents.	No

Websites	https://www.examveda.com/competitive-english/practice-mcq-question-on-grammar/

APPENDIX:

GRADING SCHEME مخطط الدرجات				
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	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar Faculty of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	SIGNAL AND SYSTEM ANALYSIS			**Module Delivery**	
Module Type	CORE			**Class Lecture** **Tutorial**	
Module Code	EEE 2210				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	2		**Semester of Delivery**	3	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ali Salam Al-Khayyat		**e-mail**	Ali-al-khayyat@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**		
Peer Reviewer Name	Ahmed A. Fadhil		**e-mail**	Ahmed-abd-h@utq.edu.iq	
Review Committee Approval			**Version Number**	1	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of studying signals and system analysis in electrical engineering is to develop a deep understanding of the behavior, characteristics, and processing of signals within various systems. Here are the key objectives and applications of studying signals and system analysis: 1. Signal Characterization and Representation: Signals are fundamental entities in electrical engineering, carrying information in various forms such as voltage, current, or electromagnetic waves. By studying signals and system analysis, you learn techniques to characterize signals in time and frequency domains. This includes understanding signal properties such as amplitude, frequency, phase, and waveform shape. You also learn methods to represent signals mathematically using mathematical functions, Fourier series, Fourier transforms, and Laplace transforms. 2. System Modeling and Design: Signals interact with systems, which can be electrical circuits, control systems, communication networks, or any other physical or mathematical constructs. By studying signal and system, you learn how to model these systems mathematically and analyze their behavior. This knowledge helps in designing and optimizing systems for specific applications, such as audio systems, image processing systems, feedback control systems, and digital communication systems. 3. Control Systems: Control systems are widely used in engineering to regulate and manipulate the behavior of physical systems. Signal and system theory plays a vital role in understanding and designing control systems. It enables you to model, analyze, and control dynamic systems using techniques such as Laplace transforms, transfer functions, and feedback control. This knowledge is essential for applications in robotics, automation, power systems, and industrial processes.

	4. Signal Analysis and Time-Frequency Analysis: Signal and system theory provides various tools for analyzing signals in both time and frequency domains. By studying signal and system, you gain proficiency in techniques like Fourier analysis, Laplace transforms, Z-transforms, and wavelet analysis. These tools are used to extract meaningful information from signals, identify their characteristics, and study their behavior under different conditions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding Signal Characteristics: Students will gain a deep understanding of various signal properties, including amplitude, frequency, phase, waveform shape, and time-domain characteristics. This knowledge allows you to interpret and analyze signals effectively. 2. Mastery of Mathematical Representations: Students will become proficient in representing signals and systems mathematically using functions, equations, transforms (such as Fourier, Laplace, and Z-transforms), and other mathematical tools. This enables them to manipulate and analyze signals and systems in different domains. 3. System Analysis and Modeling: Students will develop skills in analyzing and modeling systems, including linear time-invariant systems. This involves understanding system behavior, stability, response to different inputs, and system characteristics such as impulse response and frequency response. They will also learn to represent systems using transfer functions, state-space models, and block diagrams. 4. System Simulation and Analysis: Students will acquire skills in simulating and analyzing systems using mathematical models and simulation software. This enables them to predict system behavior, validate designs, and optimize system performance. They will learn to interpret simulation results and make informed decisions based on the analysis.

	5. Signal Analysis Tools: Students will gain proficiency in using various tools and techniques for signal analysis. This includes Fourier analysis, power spectral density estimation, time-frequency analysis using wavelets, statistical signal processing methods, and digital signal processing algorithms. These tools enable you to extract information from signals, identify signal characteristics, and analyze signal quality. 6. Problem-solving and Critical Thinking: Studying signals and system analysis enhances their problem-solving and critical thinking skills. They will learn to approach complex engineering problems analytically, apply appropriate techniques and concepts, and derive solutions. This ability to analyze and solve problems is transferable to various other areas of electrical engineering.
Indicative Contents المحتويات الإرشادية	Course Overview: This course introduces the fundamental concepts and techniques in signals and system analysis. It focuses on the mathematical tools and methodologies used in the analysis and representation of signals and systems in the time and frequency domains. The course also covers complex variables, complex functions, complex integrals, and exponential matrices, which are essential for understanding the behavior of signals and systems. Course Outline: 1. Introduction to Signals and Systems • Definition of signals and systems • Classification of signals (continuous-time vs. discrete-time, analog vs. digital) • System properties and classifications 2. Time-Domain Analysis • Review of complex numbers and phasors • Complex variables and functions • Complex integrals and contour integration • Convolution and correlation • Time-domain representations: impulse function, unit step function, unit impulse function, ramp function, etc.

	• Laplace transform and its properties • Inverse Laplace transform • Applications of Laplace transform 3. Frequency-Domain Analysis • Fourier series and Fourier transform • Properties of Fourier series and Fourier transform • Relationship between time and frequency domains • Frequency response and transfer function • Convolution theorem • Application of Fourier transform to signal analysis and filtering 4. Discrete-Time Signals and Systems • Introduction to discrete-time signals and systems • Z-transform and its properties • Inverse Z-transform • Difference equations and system representation • Analysis of discrete-time systems using Z-transform 5. Introduction to State Space Analysis • Introduction to exponential matrices • Properties of exponential matrices • Applications of exponential matrices in system dynamics and stability analysis
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When teaching a course on Signals and System Analysis in Electrical Engineering, instructors can utilize various learning and teaching strategies to enhance students' understanding and engagement. Here are some effective strategies: 1. Lectures: Conducting lectures is a common teaching method to introduce new concepts, theories, and mathematical techniques related to signals and system analysis. Instructors can use visual aids, such as slides, diagrams, and examples, to explain the material effectively. 2. Problem-solving sessions: Allocate dedicated time for problem-solving sessions where students can apply the learned concepts to solve practice problems. Encourage student participation and provide guidance during these sessions to clarify any doubts or difficulties they may encounter.

	3. Interactive discussions: Promote interactive discussions by encouraging students to ask questions, share their insights, and engage in group discussions. This fosters a deeper understanding of the subject matter and encourages critical thinking. 4. Real-world examples: Incorporate real-world examples and applications of signals and system analysis to demonstrate the practical relevance of the concepts. This helps students connect theory to real-life engineering scenarios and enhances their motivation to learn. 5. Laboratory experiments: If feasible, include laboratory experiments to provide students with hands-on experience in signal processing, system analysis, and using relevant tools and software. This allows them to apply theoretical knowledge in a practical setting and strengthens their understanding. 6. Simulation tools and software: Utilize simulation tools and software, such as MATLAB, Simulink, or Python libraries, to demonstrate signal processing techniques, system simulations, and visualization of signals and spectra. This helps students gain practical experience and reinforces theoretical concepts. 7. Assignments and projects: Assign regular assignments and projects that require students to apply their knowledge and problem-solving skills to real or simulated scenarios. This promotes active learning, independent thinking, and deeper comprehension of the subject matter. 8. Multimedia resources: Supplement lectures and readings with multimedia resources, such as videos, online tutorials, and interactive simulations. These resources can provide alternative explanations, visual demonstrations, and additional practice opportunities for students. 9. Formative and summative assessments: Conduct regular formative assessments, such as quizzes, in-class exercises, or online discussions, to monitor student progress and provide timely feedback. Additionally, administer summative assessments, such as mid-term and final examinations, to

	evaluate students' overall understanding and mastery of the course material.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 8 and 9
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 7 and 9
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Signals and Systems • Definition of signals and systems • Classification of signals and systems • System properties and classifications
Week 2	• Linear Time Invariant Systems: Discrete and Continuous Convolution
Week 3	• Continuous Time Fourier Series and Its Properties
Week 4	• Discrete Time Fourier Series and Its Properties
Week 5	Continuous Time Fourier transform • Fourier transform representation of signals • Properties of Fourier transform
Week 6	Discrete Time Fourier transform

Week 7	Midterm
Week 8	• Time-Frequency Characterization of Signals and Systems
Week 9	• Sampling
Week 10	Laplace Transform • Review of complex numbers and phasors • Laplace transform and its properties Inverse Laplace transform (Continue) • Inverse Laplace transform • Applications of Laplace transform
Week 11	Z-Transform and Discrete-Time Signals • Introduction to discrete-time signals and systems • Z-transform and its properties •
Week 12	Z-Transform and Discrete-Time Signals (Cont.) • Inverse Z-transform • Difference equations and system representation
Week 13	Introduction to State Space Analysis • Introduction to exponential matrices • Properties of exponential matrices
Week 14	State Space Analysis (Cont.) Applications of exponential matrices in system dynamics and stability analysis
Week 15	**Review and Preparation For The Exam**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Signals and Systems (Prentice-Hall signal processing series)– January 1, 1982 by Ian T. Oppenheim, Alan V.; Willsky, Alan S.; Young	Yes
Recommended Texts	F. Ulaby and A. Yagle, Signals and Systems: Theory and Applications	Yes
Websites	https://nucinkis-lab.cc.ic.ac.uk/HELM/helm_workbooks.html	

APPENDIX:

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ELECTRONICS II			**Module Delivery**	
Module Type	CORE			**Theory** **Lecture** **Lab** **Tutorial**	
Module Code	EEE 2121				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level	2		**Semester of Delivery**	4	
Administering Department	EEE		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 2121	**Semester**	3
Co-requisites module	None	**Semester**	None

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course is the second of two courses that cope with electronic devices in analog and digital circuits. The topics include differential amplifiers, and the characteristics and applications of operational amplifiers (Op-Amps). The course also discusses the design features and operation principles of special-purpose amplifiers, in addition to selected topics on linear digital integrated circuits as well as feedback and oscillator circuits. The course has an associated Laboratory experiments set, which will require the use of simulation software (e.g. Multisim and PSpice) and hardware equipment.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. FETs and BJTs-based Differential Amplifiers 2. Acquire knowledge on DC and AC analysis of operational amplifiers and switching transistors. 3. Practice on the design and operation of feedback and oscillator electronic circuit configurations. 4. Validate equivalent circuit models of electronic devices for various applications. 5- 555 Timer -based Multivibrators circuits. 6. Understand the basic principles of frequency response analysis of electronic devices and active filters design. 7. Design, analyze and interpret experiments on electronic amplifiers and integrated circuits. 8. Demonstrate the capacity to function in multi-disciplinary teams in Lab and class discussions.
Indicative Contents المحتويات الإرشادية	-Differential amplifiers: The differential pair of BJT and MOSFET, Analysis and input and output characteristics, DC analysis of a differential amplifier, AC analysis of a differential amplifier. • Common mode rejection ratio (CMRR), Speed of response, and Active load differential pair -The operational amplifier: integrators, differentiators, application to CMOS and BiMOS circuits, Active Filters: basic filter response and characteristics (low pass, high pass, band pass, and band stop) -The Oscillator and its feedback, oscillators with RC and LC feedback circuits -555 Timer-based Multivibrators (A stable, Monostable, and Bistable circuits). -Power Amplifiers: class (A, B, AB, and C)
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3, 6	LO #2, and 5
	Assignments	2	10% (10)	4, 12	LO # 1- 7
	Projects / Lab.	2	10% (10)	Continuous	
	Report	0	10% (0)		
Summative assessment	**Midterm Exam**	2 hr	20% (20)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review of the main topics in Electronics II Differential amplifiers
Week 2	Differential amplifiers
Week 3	Applications of Op-Amp's circuits.
Week 4	Applications of Op-Amp's circuits.
Week 5	Active filter design.
Week 6	Active filter design.
Week 7	Med term exam
Week 8	Feedback Amplifiers
Week 9	Feedback Amplifiers

Week 10	Oscillator circuits
Week 11	555 Timer-based multivibrators.
Week 12	555 Timer-based multivibrators.
Week 13	Power Amplifiers
Week 14	Power Amplifiers
Week 15	Power Amplifiers
Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	Op-Amp applications
Week 3,4	Op-Amp applications
Week 5,6	Active filter design
Week 7,8	Active filter design
Week 9,10	555 timer circuit (Astable, Monostable, and Bistable)
Week 11,12	555 timer circuit (Astable, Monostable, and Bistable)
Week 13,14	Power Amplifiers
Week 15,16	Review and final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	R. L. Boylestad and L. Nashelsky, Electronic devices and circuit theory, 11th Edition, Pearson Education, 2013. ISBN: 9780132622264	Yes
Recommended Texts		
Websites		

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	AC MACHINES	**Module Delivery**	
Module Type	CORE	✓ Theory ✓ **Lecture** ✓ **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE2211		
ECTS Credits	7		
SWL (hr/sem)	175		

Module Level	UGII	**Semester of Delivery**	4
Administering Department	Electrical & Electronics Dept	**College**	College of Engineering
Module Leader	M.Sc. Rawaa Kadhim	**e-mail**	Rawaa.kadhim@utq.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	16/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	**EEE 2110**	**Semester**	2

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. An ability to describe the construction, operation and application of single phase transformer and three phase transformer. 2. An ability to classify of transformer on the basis of application, winding and construction. 3. An ability to solve problems relating to losses and efficiency in transformer and know the conditions at which a transformer works at maximum efficiency. 4. An ability to derive the equivalent circuit of a transformer from measurements. 5. Know the various winding connections of three-phase transformers and what are their relative merits and demerits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student will be able to understand the basic principles of operation of single-phase transformer and three-phase transformer and their applications. 2. The student will be able to deal with the equivalent circuits of single-phase transformer and three-phase transformer, and the ability to calculate the losses and efficiency at any load. 3. The student will be able to deal with various winding connections of three-phase transformers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: - Types of Transformer, Working Principle of a single phase Transformer, Construction of Transformer, Ideal transformer, Practical Transformer, Equivalent Circuit of single phase transformer, Equivalent circuit of a Loaded Transformer referred to primary, Equivalent circuit of a Loaded Transformer referred to secondary, Approximate Equivalent Circuit of a Loaded Transformer, Approximate Voltage Drop in a Transformer, Voltage Regulation, Transformer losses, efficiency and Maximum Efficiency, Transformer Tests, Three-Phase Transformer, Three-phase Transformer Connections. Three-phase Transformer losses, efficiency, Solved examples and applications.

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.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Types of Transformers, Working Principle of a single-phase Transformer.
Week 2	Construction of Transformer.

Week 3	Ideal transformer.
Week 4	Practical Transformer.
Week 5	Equivalent Circuit of single-phase transformer, Equivalent circuit of a Loaded Transformer referred to primary.
Week 6	Equivalent circuit of a Loaded Transformer referred to secondary.
Week 7	Approximate Equivalent Circuit of a Loaded Transformer.
Week 8	Approximate Voltage Drop in a Transformer, Voltage Regulation.
Week 9	Transformer losses, efficiency, and Maximum Efficiency.
Week 10	Continue
Week 11	Midterm Exam:
Week 12	Transformer Tests
Week 13	Three-phase Transformer: Advantage of Three-phase Transformer and Three-phase Transformer Connections.
Week 14	Three-phase Transformer losses and efficiency, Solved examples and applications.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: The No- Load operation of single-phase transformer, finding its turn's ratio and
Week 2	Lab2: Short circuit test for single-phase transformer, analysis the cupper losses.
Week 3	Lab 3: Loaded operation of single-phase transformer, finding regulation and efficiency of it.
Week 4	Lab 4: Load operation of three-phase transformer
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:
Week 8	Lab 8:
Week 9	Lab 9:
Week 10	Lab 10:
Week11	Lab 11:

Week12	Lab 12: The no-load of three phase synchronous machine as synchronous generator.
Week13	Lab 13 Obtaining the "V" curve of synchronous motor operating at load
Week14	Lab 14: Power factor (cos Ø) correction in three phase circuit .

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stephen J. Chapman, "Electric Machinery Fundamentals", 4th edition, Mc Graw Hill, 2005.	Yes
Recommended Texts	A. Draper, "Electrical Machines" , 2nd edition, Longman, 1979.	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	مجالات كهربائية ساكنة ELECTROSTATIC FIELDS		**Module Delivery**		
Module Type	CORE		**Theory** **Lecture** **Tutorial**		
Module Code	EEE 2220				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	UGII	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Msc. Ahmed Abdulredha		**e-mail**	Ahmed.Abdulredha@utq.edu.iq	
Peer Reviewer Name	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	18/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

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 vector and scalar quantities. 2. To understand Coulomb's law, electric field intensity. 3. To understand Gauss' law. 4. To understand Maxwell's first equation. 5. To understand Potential difference and potential. 6. To understand Current and current density, Continuity of current 7. To understand Boundary conditions for perfect dielectric materials
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To solve all vector problems, calculate unit vectors, able to transform between all coordinate systems. 2. Able to solve coulomb's law problems. 3. Able to obtain electric field intensity according to charge type. 4. Able to apply of Gauss's law. 5. Able to obtain Divergence from Gauss's law. 6. Able to use Maxwell's first equation (electrostatic). 7. Able to solve divergence theorem problems. 8. Able to obtain energy expended in moving a point charge in an electric field. 9. Able to obtain energy density in electrostatic field. 10. Able to obtain Potential difference and potential. 11. Able to obtain the potential field of a system of charges [conservative property]. 12. Able to obtain Potential field of a point charge. 13. Able to obtain Potential gradient. 14. Able to obtain current and current density, continuity of current. 15. Able to obtain capacitance, capacitance of two-wire line. 16. Able to solve examples on the solution of Laplace's equation. 17. Able to solve examples on the solution of Poisson's equation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Course Introduction and Overview -Scalar and vector, vector algebra -Vector components and unit vector -The dot product, The cross product -Cylindrical coordinates -Spherical coordinates -Coulomb's law -The electric field or electric field intensity -Field due to continuous volume charge distribution -Field of line charge, Field of sheet of charge -Electric field lines or streamlines

	-Application of Gauss's law -Application of Gauss's law: differential volume element -Divergence -Maxwell's first equation (electrostatic) -The del operator -The divergence theorem -Energy expended in moving a point charge in an electric field -The electric dipole -Energy density in electrostatic field -The line integral -Potential difference and potential -The potential field of a system of charges [conservative property] -Potential field of a point charge -Potential gradient Current and current density, Continuity of current -Metallic conductors, Conductor properties and boundary conditions -The method of images -Semiconductors -The method of images -The nature of dielectric materials -Boundary conditions for perfect dielectric materials -Capacitance, capacitance of two-wire line -Uniqueness theorem -Example on the solution of Laplace's equation -Example on the solution of Poisson's equation
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	3	10% (10)	2, 12	LO # 3, 4, 6 and 7
Summative assessment	Midterm Exam	1.5 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction, Scalar and vector, vector algebra, Vector components and unit vector.
Week 2	The dot product, The cross product, cylindrical coordinates.
Week 3	Spherical coordinates
Week 4	Coulomb's law, electric field or electric field intensity
Week 5	Field due to continuous volume charge distribution, Field of line charge, Field of sheet of charge
Week 6	Electric field lines or streamlines, Application of Gauss's law
Week 7	Application of Gauss's law: differential volume element, Divergence
Week 8	Maxwell's first equation (electrostatic), The del operator, The divergence theorem
Week 9	Energy expended in moving a point charge in an electric field, The electric dipole,
Week 10	Energy density in electrostatic field, The line integral, Potential difference and potential
Week 11	The potential field of a system of charges, Potential field of a point charge, Potential gradient
Week 12	Current and current density, Continuity of current, Metallic conductors, Conductor properties and boundary conditions, The method of images, Semiconductors
Week 13	The method of images, The nature of dielectric materials, Boundary conditions for perfect dielectric materials, Capacitance, capacitance of two-wire line
Week 14	Uniqueness theorem, Example on the solution of Laplace's equation, Example on the solution of Poisson's equation, Product solution of Laplace's equation
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Engineering Electromagnetics (9th edition), William H. Hayt, Jr. and John A. Buck, 2018.	Yes
Recommended Texts	1- Engineering Electromagnetics (3rd edition), Natahn Ida, 2015. 2- Elements of Electromagnetic, Mathew N.O. Sadiku, 4th edition, Oxford University Press.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	HUMAN RIGHTS AND DEMOCRACY حقوق الانسان والديمقراطية			**Module Delivery**	
Module Type	SUPLEMENT			**Class Lecture** **Tutorial**	
Module Code	UR 201				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	1		**Semester of Delivery**	1	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	18/6/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	ان الاهداف الاساسية لتدريس هذه المادة هي تعريف الطالب بما يلي: مفهوم حقوق الانسان، تعريف حقوق الانسان، خصائص حقوق الانسان، الحريات العامة وحقوق الانسان في التاريخ القديم، موقف الشرائع السماوية من حقوق الانسان، الحضارة الغربية وحقوق الانسان ، المصادر القانونية لحقوق الانسان، اعلان حقوق الانسان للمواطن الفرنسي، منظمة الامم المتحدة وحقوق الانسان، المنظمة الدولية لحقوق الانسان، الجمعية العامة، مشروع الميثاق العربي لحقوق الانسان، المنظمات الغير حكومية ودورها في حقوق الانسان، منظمة العفو الدولية، المنظمة العربية لحقوق الانسان المكونات الرئيسية للديمقراطية، الديمقراطية المباشرة، الديمقراطية النيابية، الديمقراطية شبه مباشرة ، اساليب الديمقراطية، الاستفتاء الشعبي، انواع الحكومات، معنى الدستور، انواع الدساتير، اساليب الدساتير،،مبادى الدستور الديمقراطي، اركان النظام النيابي، النظام البرلماني في بريطانيا, نموذج من التجربة البريطانية، البرلمانات العربية
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	من اهم المخرجات التي يحصل عليها الطالب عند دراسة هذه المادة هو فهم مايجري حوله من احداث سياسية ذات تاثير مباشر على حياته اليومية. فبعد دراسة المادة وفهم مفرداتها يصبح الطالب مطلعا على ما عليه من واجبات وماله من حقوق في المجتمع والحدود المرسومة له ضمن اطار المجتمع الواحد.
Indicative Contents المحتويات الإرشادية	مفهوم حقوق الانسان، تعريف حقوق الانسان، خصائص حقوق الانسان، الحريات العامة وحقوق الانسان في التاريخ القديم، موقف الشرائع السماوية من حقوق الانسان المكونات الرئيسية للديمقراطية، الديمقراطية المباشرة، الديمقراطية النيابية، الديمقراطية شبه مباشرة ، اساليب الديمقراطية، الاستفتاء الشعبي، انواع الحكومات، معنى الدستور
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. إثارة اسئلة متنوعة يمكن عبرها استدعاء المعلومات 2. شرح موضوع ما عبر مصادر متنوعة ومحاولة ربط المصادر بعضها ببعض 3. مشاهدة بعض البرامج والندوات العلمية والمؤتمرات العلمية والتربوية

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	10% (10)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Midterm Exam	1.5 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Summative assessment	100% (100 Marks)				

Learning and Teaching Resources
مصادر التعلم والتدريس

1. الكتب والمقالات التي يوفرها استاذ المادة ولاسيما القوانين الدولية التي ترتبط بشكل مباشر بالديمقراطية وحقوق الانسان

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	A - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	FX – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	PROBABILISTIC METHODS	**Module Delivery**	
Module Type	CORE	**Class Lecture Tutorial**	
Module Code	EEE 3110		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	**UGIII**	**Semester of Delivery**	5
Administering Department	EEE Dept.	**College**	Engineering College
Module Leader	Dr. Zahraa M. Baqir	**e-mail**	Zahraam.baqer@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	ER105	**Semester**	One
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Provide a solid foundation in basic probability concepts such as sample spaces, events, probability axioms, conditional probability, independence, and random variables. 2. Develop skills in calculating probabilities using various techniques such as counting methods, combinatorics, permutations, and combinations. 3. Introduce different probability distributions such as discrete distributions (binomial, Poisson) and continuous distributions (normal, exponential) and their properties. It may also cover topics like expectation, variance, and moment generating functions. 4. Explore the concept of conditional probability, including conditional expectations, conditional distributions, and the application of Bayes' theorem in solving probability problems. 5. Study random variables, their probability distributions, and key properties. It may include discussions on probability mass functions, probability density functions, cumulative distribution functions, and transformations of random variables. 6. Enhance problem-solving skills and promote critical thinking by engaging students in solving probability problems, analyzing real-life scenarios, and applying probability concepts to make informed decisions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental concepts of probability theory. 2. Apply probability concepts to analyze real-world scenarios and decision-making processes. 3. Calculate probabilities and interpret probability distributions. 4. Utilize probability in statistical analysis and data interpretation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Probability: Sample spaces and events, Basic probability axioms, Complementary, mutually exclusive, and independent events. [7 hrs] Combinatorics and Counting: Permutations and combinations, Binomial coefficients, Multinomial coefficients [7 hrs]

	Conditional Probability and Bayes' Theorem:Definition and properties of conditional probability, Multiplication rule and total probability theorem Bayes' theorem and its applications [7 hrs] Random Variables: Definition and types of random variables Probability mass function (PMF) and probability density function (PDF) Cumulative distribution function (CDF). [9 hrs] Revision problem classes. [10 hrs] Expectation and Variance: Expected value of a random variable, Linearity of expectation, Variance and standard deviation. [7 hrs] Discrete Probability Distributions: Bernoulli distribution, Binomial distribution, Poisson distribution. [7 hrs] Continuous Probability Distributions: Uniform distribution, Normal distribution. [8hrs] Joint Probability Distributions: Limit Theorems, Applications of limit theorems in probability and statistics, Applications of Probability. [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 lectures, tutorials, group work, case studies, or any other relevant activities.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Midterm Exam	1.5 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Summative assessment	100% (100 Marks)				

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction-Basic concepts: Random experiments, sample space, events, Basic operations with random events, Measure of the probability, Properties of probability.
Week 2	Measure of the probability, Properties of the probability.
Week 3	Conditional probability, Independent events, Basic Theorems of probabilities: Multiplicative Law, Total, Probability theorem and Bayes' theorem.
Week 4	Counting Sample Points: Multiplication rule, Permutations, Combinations.
Week 5	Random variable:Concept of random variable, Discrete random variables, Probability Mass Function(PMF), Cumulative Distribution Function(CDF)
Week 6	Expected Value, Expectation of a function of a random variable, Variance, Moments
Week 7	Random variables: Continuous random variables: Probability Density Function (PDF), Cumulative Distribution Function (CDF), Expected value, variance and some of their properties, Moments.
Week 8	Mid-term Exam
Week 9	Discrete Probability Distributions, Uniform Distribution, Binomial Distribution, Poisson Distribution.
Week 10	Continues Probability Distributions: Uniform distribution, Normal distribution
Week 11	Gaussian random variables and other probability density Functions.
Week 12	Joint Probability Distributions: Joint PMF and joint PDF, Marginal and conditional distributions, Covariance and correlation
Week 13	Limit Theorems: Law of large numbers, Central limit theorem, Applications of limit theorems in probability and statistics
Week 14	Functions of Random Variables with Applications in finance, engineering, and computer science
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Probabilistic Methods of Signal and System Analysis	Yes
Recommended Texts	"A First Course in Probability" by Sheldon Ross "Probability Essentials" by Jean Jacod and Philip Protter	Yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	POWER ENGINEERING	**Module Delivery**	
Module Type	CORE	**Theory** **Tutorial** **Report** **Project**	
Module Code	EEE 3120		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3	**Semester of Delivery**	5
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Dr. Hayder Andulhasan Abdulrahem	**e-mail**	h.abdulrahem@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	14/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE 2112	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. provide students with a comprehensive understanding of the fundamental concepts and principles of power engineering. This includes studying electrical circuits, power systems, energy conversion, and power generation technologies. 2. Learn about power generation and distribution technologies: The aim of this module is to introduce students to various power generation technologies such as thermal power plants, hydroelectric power plants, wind farms, and solar power systems. Additionally, it covers the principles of power distribution and transmission systems. 3. Gain knowledge of power quality and energy efficiency: This module aims to familiarize students with the concepts of power quality and energy efficiency in power systems. Students will learn about the causes and effects of power quality issues, as well as techniques to improve energy efficiency and reduce losses in power systems. 4. Learn about performance of transmission line (short, medium, and long), General 2-port constant (ABCD constants), power circle diagram, Corona, overhead transmission line insulators, sag, and stress calculation, conductors' types and performance of underground cables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a comprehensive understanding of the fundamental concepts and principles of power engineering, including electrical circuits, power systems, energy conversion, and power generation technologies. 2. Explain the operation and characteristics of various power generation technologies, such as thermal power plants, hydroelectric power plants, wind farms, and solar power systems, and understand their integration into the power grid. 3. Identify and address power quality issues in power systems, understanding their causes and effects, and propose measures to improve power quality and energy efficiency, minimizing losses and ensuring reliable power supply. 4. Apply critical thinking and problem-solving skills to analyze and solve complex power system problems, evaluate different design options, and make informed decisions considering technical, economic, and environmental factors..
Indicative Contents المحتويات الإرشادية	Introduction to Power Engineering • Overview of power systems and their components • Basic electrical concepts and laws

	• Energy conversion and power generation principles. Power Generation Technologies • Thermal power plants and their operation • Hydroelectric power plants and their characteristics • Wind power systems and their integration • Solar power systems and their components Transmission lines electrical design, line parameters, short, medium, and long lines, voltage drop, power losses, circle diagrams. Mechanical design, sag and tension, supports materials and types. Overhead line insulators, types and materials, voltage distribution and grading. Corona phenomenon, disruptive and visual voltages, corona losses. Low, medium, and high voltage power cables, insulating materials, electrical parameters, cable selection and laying
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Conduct regular lectures to introduce and explain the theoretical concepts, principles, and analytical techniques of power Engineering. Use visual aids, demonstrations, and real-life examples to enhance understanding. 2. Problem-Solving Exercises: Assign problem sets and exercises that require students to analyze and solve power systems problems. Encourage students to think critically, apply appropriate methodologies, and present their solutions effectively. 3. Online Resources: Provide access to online resources such as textbooks, research papers, and educational videos to supplement classroom learning. Encourage students to explore these resources to deepen their understanding of power electronics concepts. 4. Formative and Summative Assessments: Conduct regular formative assessments, such as quizzes and in-class exercises, to gauge students' understanding and provide timely feedback. Additionally, administer summative assessments, to evaluate students' overall knowledge and skills.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem)	72	**Unstructured SWL (h/w)**	5

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, and2,
	Assignments	2	10% (10)	2, 12	LO # 1,2 and 3
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Energy resources
Week 2	Type of power generating station
Week 3	Load curve and load factor Example
Week 4	Transmission line /electrical design, Resistance and inductance
Week 5	Three phase inductances
Week 6	Single phase capacitance
Week 7	Three phase capacitances
Week 8	Mechanical design of transmission line
Week 9	Sag and tension
Week 10	Overhead line insulator
Week 11	Short line parameters
Week 12	Medium line parameters,
Week 13	Long line parameters
Week 14	Voltage drops and power efficiency
Week 15	Underground cables.

Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	V.K. Mehta – (Principles of Power System)	Yes (+Soft copy)
Recommended Texts	Power System Analysis and Design" by J. Duncan Glover, Mulukutla S. Sarma, and Thomas Overbye Stevenson, W. D., Elements of Power System Analysis, McGraw-Hill, 1982	No
Websites	.	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	DIGITAL SYSTEM DESIGN تصميم نظم رقمية	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE 3130		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	3	**Semester of Delivery**	5
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Msc. Riham Ali Zbaid	**e-mail**	eng.riham@utq.edu.iq
Module Leader's Acad. Title	Assistant lecturer	**Module Leader's Qualification**	Msc
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	Dr.Amean Al-Safi	**e-mail**	amean.alsafi@utq.edu.iq
Review Committee Approval	17/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE 2120	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The curriculum of the Digital Systems Design course aims to introduce students to theoretical principles, rules, and matters that must be considered during digital electronic design, and how to build and design control units and data transmission. Introducing the student to one of the important programming languages VHDL and how to write it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student learns the basics of digital systems design for synchronous and asynchronous circuits. 2. Understand the basics of data transmission and control units for synchronous circuits 3. He learns how to think about the method of designing a digital system and linking data transmission with control units. 4. The student learns the types of asynchronous digital system design. 5. Learning the important algorithms in building digital systems. 6. Familiarity with basic concepts of FSM and Datapath Unit (DU), Control Unit (CU) Microcoding and Microprogrammed FSM Microprograms based on Microsequencer. 7. Familiarity with the basic concepts of asynchronous series circuits
Indicative Contents المحتويات الإرشادية	
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.64
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.07
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Time faults in combinational logic circuits Stuck-at-faults in combinational logic
Week 2	Synchronous sequential circuit analysis and synthesis, Synchronous logic design with state machines, the ASM method,– Finite state machine models
Week 3	Impediments to synchronous logic circuit design
Week 4	Programmable (microcoded) system controllers
Week 5	Analysis and design of asynchronous sequential machines, hazards in asynchronous circuits
Week 6	Architecture of CPLDs and FPGAs, design and simulation of combinational logic circuits using VHDL and ModelSim
Week 7	Mid-term Exam .Design and simulation of synchronous finite state machines using FPGAs, VHDL and ModelSim
Week 8	Use of PPGAs, VHDL and ModelSim to design and simulate asynchronous sequential logic circuits
Week 9	MOSFET transistor models, static and dynamic behavior The static CMOS inverter: static and dynamic behavior, power consumption, the effects of technology scaling
Week 10	Design of combinational logic gates in CMOS: static and dynamic design styles, power consumption
Week 11	TTL (Bipolar) Circuits , Practical Considerations in the Use of TTL
Week 12	Comparison of CMOS and TTL Performance ,Emitter-Coupled Logic (ECL) Circuits PMOS, NMOS, and E2CMOS
Week 13	Introduction -Signal Conversion and Processing (Analog-to-Digital Conversion)
Week 14	Methods of Analog-to-Digital Conversion , Methods of Digital-to-Analog Conversion
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction To VHDL coding with simple examples (And, Or , XOR)
Week 2	Lab 2: VHDL code for combinational designs (adder, subtractors)
Week 3	Lab 3: Decoder, Encoder, MUX, DeMUX in modelism
Week 4	Lab 4: VHDL code for flip-flops (SR, D,T, JK)
Week 5	Lab 5: Counters and Shift Registers in Modelsim
Week 6	Lab 6: Introduction To FPGA Hardware Implementation
Week 7	Lab 7: State machine design and implementation using FPGA
Week 8	LAB 8: Advanced design topics Using FPGA

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Digital Systems Design Using VHDL (2 nd Edition), Charles H. Roth, Lizy Kurian John, 2008, Thomson. 2-Thomas L. Floyd-Digital Fundamentals-Prentice Hall (2014)	Yes
Recommended Texts		
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ADVANCED AC MACHINE			**Module Delivery**	
Module Type	ELECTIVE			✓ Theory ✓ **Lecture** ✓ **Lab** **Tutorial** **Practical** **Seminar**	
Module Code	EEE3140				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Electrical & Electronics Dept		**College**	College of Engineering	
Module Leader	M.Sc. Rawaa Kadhim		**e-mail**	Rawaa.kadhim@utq.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	16/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**EEE 2211**	**Semester**	4

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. An ability to describe the equivalent circuits of three-phase induction motor, single phase induction motor, synchronous generator and synchronous motor. 2. An ability to solve problems relating to torque, developed power, efficiency in induction motor. 3. An ability to describe the equivalent circuits of three-phase induction motor, single phase induction motor and synchronous generator. 4. Know the Condition for Maximum torque developed in an induction motor. 5. Understand the construction of double Squirrel Cage Motor and equivalent circuit. 6. An ability to know what the factors on which speed of an induction motor are depends and understand how the speed of induction motors can be controlled. 7. Understand how a single-phase induction motor is made self-starting 8. Understand how emf is induced in a synchronous generator, various factors on which induced emf in an alternator depends. 9. Understand the effect of armature reaction on the terminal voltage of alternator. 10. Understand how synchronous motor operates on load.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The student understands how the 3-phase induction motor rotates and how speed of three phase induction motor is controlled. 2. The student learns how to deal with the equivalent circuits of three phase induction motor, double Squirrel Cage Motor, single phase induction motor and, the ability to calculate the torque, losses and efficiency. 3. The student understands the basic principles of operation of three-phase induction motor, single-phase induction motor, synchronous generator and synchronous motor. 4. The student learns how to deal with the equivalent circuits of synchronous generator and synchronous motor, and the ability to calculate the torque, losses and efficiency. 5. The student ability to describe the differences between a synchronous machine and an induction machine.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part I: Induction Motor: In this part, focuses on three-phase induction motor and single-phase induction motor. We will primarily be concerned with the following topics: Classification of A.C. Motors, General Principle of induction motor, Construction of induction motor, Slip, Relation between Torque and Rotor Power Factor, Starting Torque, Condition for Maximum Starting Torque, Rotor E.M.F and Reactance under Running Conditions, Condition for Maximum Torque Under Running Conditions, Relation between Torque and Slip, Power Stages in an Induction Motor, Torque Developed by an Induction Motor Induction Motor, Equivalent Circuit of an Induction Motor, Maximum Power Output, Speed Control of Induction Motor, Double Sqiurrel-cage Motor, Classification of Single-phase Motors, Single-phase Induction Motor, Double-field Revolving Theory, Equivalent Circuit of a Single-phase Induction Motor. Part II: Synchronous Machine: In this part, focuses on the synchronous generator and synchronous motor. We will primarily be concerned with the following topics: Basic Principle of Synchronous Generators, Construction of Synchronous Generators, Relation between Frequency, Speed and Number of Poles, Armature Winding, Pitch Factors and Distribution Factors, Equation of Induced E.M.F, Alternator on Load, Synchronous Reactance, Equivalent Circuit of an Alternator and Phasor Diagram, Working Principle of a Synchronous Motor , Method of Starting and Equivalent Circuit of a Synchronous and Phasor Diagram
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.

Student Workload (SWL) الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Three phase induction motor: Classification of A.C. Motors, General Principle and Construction of induction motor. Slip and Relation between Torque and Rotor Power Factor.
Week 2	Three phase induction motor: Starting Torque and Condition for Maximum Starting.
Week 3	Maximum Torque and Condition for Maximum Torque Under Running, and Relation between Torque and Slip.
Week 4	Three phase induction motor: Power Stages in an Induction Motor
Week 5	Equivalent Circuit of an Induction Motor.
Week 6	Three phase induction motor: Maximum Power Output and Speed Control of Induction Motor
Week 7	Three phase induction motor: Double Sqiurrel-cage Motor and Equivalent Circuit of Double Sqiurrel-cage Motor.
Week 8	Midterm Exam: Single phase induction motor and Equivalent Circuit of a Single-phase induction motor.
Week 9	Synchronous Generators: Basic Principle and Construction of Synchronous Generators.
Week 10	Armature Winding and Equation of Induced E.M.F. of Synchronous Generators

Week 11	Continue
Week 12	Synchronous Generators: Alternator on Load and Equivalent Circuit of an Alternator and Phasor Diagram.
Week 13	Synchronous Motor: Working Principle of a Three-phase Synchronous Motor.
Week 14	Method of Starting and Equivalent Circuit of a Synchronous Motor.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Finding the slip in three-phase asynchronous motor.
Week 2	Lab2: No-load operation of three-phase asynchronous motor.
Week 3	Lab 3: Short circuit (blocking rotor) test of three-phase asynchronous motor
Week 4	Lab 4: Loaded operation of three-phase synchronous motor.
Week 5	Lab 5: Starting of three-phase asynchronous motor (directly, serial resistance-reactance, and auto-transformer).
Week 6	Lab 6: Starting of three-phase asynchronous motor with $Y-\Delta$ switching, and Operating of three-phase asynchronous motor with frequency controller
Week 7	Lab 7: No Load operation of single-phase asynchronous motor with auxiliary winding and double capacitors, rotation direction change.
Week 8	Lab 8: Operation of single-phase motor with auxiliary winding and double capacitors under load.
Week 9	Lab 9: The no-load of three-phase synchronous machine as synchronous generator.
Week 10	Lab 10: Obtaining the "V" curve of synchronous motor operating at load
Week11	Lab 11: Power factor ($\cos \emptyset$) correction in three-phase circuit.
Week12	Lab 12:
Week13	Lab 13
Week14	Lab 14:

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	N. Mohan, "Electric Drives": An Integrative Approach, 2003 edition, MNPERE Publishers	Yes
Recommended Texts	1-"Electric Drives" ; N. Mohan 2- "Electrical Technology", B.L. Theraja; A.K. Theraja_ 3- "Electrical Machines" ;S. K. Sahdev	
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	مجالات كهرومغناطيسية ELECTROMAGNETIC FIELDS		**Module Delivery**		
Module Type	CORE		**Theory** **Lecture** **Tutorial**		
Module Code	EEE 3121				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGIII		**Semester of Delivery**	UGIII	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Msc. Ahmed Abdulredha		**e-mail**	Ahmed.Abdulredha@utq.edu.iq	
Peer Reviewer Name	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	18/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 2220	**Semester**	Four
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand Biot-Savart law and steady magnetic fields, Ampere's circuital law, Curl & Stoke's theorem. 2. To understand Magnetic flux and magnetic flux density, The scalar and vector magnetic potentials, Derivation of the steady-magnetic field laws. 3. To understand force on a moving charge, force on differential current element, force between differential current elements, force and torque on a closed circuit. 4. To understand the nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions. 5. To understand the magnetic circuits, Potential energy and forces on magnetic materials, Inductance and mutual inductance. 6. To understand Maxwell's equations, time varying fields and the basic concept of wave and wave propagation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Able to apply Biot-Savart law and steady magnetic fields. 2. Able to apply Ampere's circuital law. 3. Able to solve Curl & Stoke's theorem. 4. Calculate Magnetic flux and magnetic flux density. 5. Able to derive the steady-magnetic field laws. 6. Able to calculate force and torque on a closed circuit. 7. Able to obtain Magnetization and permeability 8. Able to obtain Inductance and mutual inductance. 9. Able to apply Faraday's law. 10. Able to obtain Displacement current. 11. Able to solve Maxwell's equations. 12. Able to find electric field from magnetic and vice versa.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. -Biot-Savart law and steady magnetic fields -Ampere's circuital law -Curl & Stoke's theorem -Magnetic flux and magnetic flux density -The scalar and vector magnetic potentials -Derivation of the steady-magnetic field laws -Force on a moving charge -Force on differential current element

	-Force between differential current elements -Force and torque on a closed circuit -The nature of magnetic materials- -Magnetization and permeability -Magnetic boundary conditions -The magnetic circuits -Potential energy and forces on magnetic materials -Inductance and mutual inductance -Faraday's law -Displacement current -Maxwell's equations in point form -Maxwell's equations in integral form The Retarded Potentials Examples on Using Maxwell's equation to find different EMW components
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	3	10% (10)	2, 12	LO # 3, 4, 6 and 7
Summative assessment	**Midterm Exam**	1.5 hr	20% (20)	7	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Course introduction and the main causes of magnetic fields
Week 2	Biot-Savart law and steady magnetic fields
Week 3	Ampere's circuital law, Curl & Stoke's theorem
Week 4	The scalar and vector magnetic potentialsوMagnetic flux and magnetic flux density
Week 5	Derivation of the steady-magnetic field laws, Force on a moving charge
Week 6	Force on differential current element, Force between differential current elements
Week 7	Force and torque on a closed circuit, The nature of magnetic materials
Week 8	Magnetization and permeability, Magnetic boundary conditions
Week 9	The magnetic circuits, Potential energy and forces on magnetic materials
Week 10	Inductance and mutual inductance
Week 11	Faraday's law, Displacement current
Week 12	Maxwell's equations in point form, Maxwell's equations in integral form
Week 13	The Retarded Potentials
Week 14	Examples on Using Maxwell's equation to find different EMW components
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Engineering Electromagnetics (9th edition), William H. Hayt, Jr. and John A. Buck, 2018.	Yes
Recommended Texts	1- Engineering Electromagnetics (3rd edition), Natahn Ida, 2015. 2- Elements of Electromagnetic, Mathew N.O. Sadiku, 4th edition, Oxford University Press.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	MICROWAVES موجات دقيقة		**Module Delivery**		
Module Type	ELECTIVE		**Theory** **Lecture** **Tutorial**		
Module Code	EEE 3210				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGIII		**Semester of Delivery**	UGIII	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Msc. Ahmed Abdulredha		**e-mail**	Ahmed.Abdulredha@utq.edu.iq	
Peer Reviewer Name	Dr. Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	19/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 3121	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand MW Engineering and time varying fields, transmission line theory Vs circuit theory. 2. To understand wave propagation on a transmission line. 3. To understand field analysis of transmission Lines. 4. To understand impedance, and power flow for the lossless. 5. To understand coaxial line. 6. To understand the smith chart. 7. To understand the terminated lossless transmission line. 8. To understand the quarter-wave transformer 9. To understand wave at oblique incident angles. 10. To understand generator and load mismatches. 11. Understanding transmission lines and waveguides. 12. Understanding general solutions for TEM, TE, and TM waves. 13. Understanding microwave network analysis. 14. Understanding impedance matching and tuning.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To solve all problems of wave propagation on a transmission line. 2. Able to recognize between the transmission line. 3. Able to calculate transmission line parameters. 4. Recognize between wave polarization types. 5. Knowledge of propagation constant. 6. Able to deals with The Smith Chart. 7. Able to solve problems of lossy transmission lines. 8. Able to solve problems of transmission lines and waveguides. 9. Able to solve problems of TEM, TE, and TM Waves. 10. Able to analysis of rectangular waveguide. 11. Knowledge impedance and equivalent voltages and currents. 12. Knowledge Impedance and Admittance Matrices. 13. Knowledge, The Scattering Matrix, The Transmission (ABCD)Matrix. 14. Able to solve problems of Microwave circuits. 15. Able to solve problems of impedance matching and tuning.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to MW Engineering and time varying fields, Transmission Line theory Vs circuit Theory, The Lumped-Element Circuit Model for a

	Transmission Line, Wave Propagation on a Transmission Line, The Lossless Line, Field Analysis of Transmission Lines, Transmission Line Parameters, The Telegrapher Equations Derived from Field Analysis of a Coaxial Line, Propagation Constant , Impedance ,and Power Flow for the Lossless, Coaxial Line, The Terminated Lossless Transmission Line, Special Cases of Lossless Terminated Lines, The Smith Chart, The Quarter-Wave Transformer, Generator and Load Mismatches, Lossy Transmission Lines, The Low Loss Line The Distortion less Line, The Terminated Lossy Line, Transients on Transmission Lines. Transmission Lines and waveguides, General Solutions for TEM, TE, and TM Waves, Rectangular Waveguide, TEM Modes, TE Modes TM Modes, Circular Waveguide, Parallel Plate Waveguide, TEM Modes, TM Modes, TE Modes, Coaxial Line, TEM Modes, Higher Order Modes MICROWAVE NETWORK ANALYSIS Impedance and Equivalent Voltages and Currents, Impedance and Admittance Matrices, The Scattering Matrix, The Transmission (ABCD)Matrix, Signal Flow Graphs, Microwave circuits (Dividers, couplers, hybrids, Microwave network analysis, Discontinuities and Modal Analysis, Excitation of Waveguides—Electric and Magnetic Currents, Excitation of Waveguides—Aperture Coupling) IMPEDANCE MATCHING AND TUNING Matching with Lumped Elements, Single-Stub Tuning, Double-Stub Tuning, The Quarter-Wave Transformer
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Midterm Exam	1.5 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Summative assessment	100% (100 Marks)				

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to MW Engineering and time varying fields, Transmission Line theory Vs circuit Theory, The Lumped-Element Circuit Model for a Transmission Line.
Week 2	Wave Propagation on a Transmission Line, The Lossless Line, Field Analysis of Transmission Lines, Transmission Line Parameters, The Telegrapher Equations Derived from Field Analysis of a Coaxial Line.
Week 3	Propagation Constant, Impedance, and Power Flow for the Lossless, Coaxial Line, The Terminated Lossless Transmission Line, Special Cases of Lossless.
Week 4	Terminated Lines, The Smith Chart, The Quarter-Wave Transformer, Generator and Load Mismatches, Lossy Transmission Lines.
Week 5	The Low Loss Line The Distortion less Line, The Terminated Lossy Line, Transients on Transmission Lines.
Week 6	Transmission Lines and waveguides, General Solutions for TEM, TE, and TM Waves.
Week 7	Rectangular Waveguide, TEM Modes, TE Modes TM Modes, Circular Waveguide.

Week 8	Parallel Plate Waveguide, TEM Modes, TM Modes, TE Modes.
Week 9	Coaxial Line, TEM Modes, Higher Order Modes, Impedance and Equivalent Voltages and Currents, Impedance and Admittance Matrices.
Week 10	The Scattering Matrix, The Transmission (ABCD)Matrix, Signal Flow Graphs.
Week 11	Dividers, couplers, hybrids, Microwave network analysis, Discontinuities and Modal Analysis.
Week 12	Excitation of Waveguides—Electric and Magnetic Currents, Excitation of Waveguides—Aperture Coupling).
Week 13	Matching with Lumped Elements, Single-Stub Tuning.
Week 14	Double-Stub Tuning, The Quarter-Wave Transformer.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	D.M. Pozar, Microwave Engineering, 4th edition, Addison-Wesley, 2012.	Yes
Recommended Texts	1- Engineering Electromagnetics (9th edition), William H. Hayt, Jr. and John A. Buck, 2018. 2- Engineering Electromagnetics (3rd edition), Natahn Ida, 2015. 3- Elements of Electromagnetic, Mathew N.O. Sadiku, 4th edition, Oxford University Press.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
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	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	COMMUNICATION SYSTEMS	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Lab**	
Module Code	EEE3220		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	**Semester of Delivery**	2
Administering Department	EEE	**College**	ER
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ahmed A. Fadhil	**e-mail**	ahmed-abd-h@utq.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE2210 and EEE3110	**Semester**	UGII-2 and UGIII-1

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. To develop a basic understanding of communication systems. 2. To understand different types of communications systems at the basic level starting from the basic analog communication techniques. 3. This is the basic subject for all electrical and electronic engineering students and in particular to those who wish to continue in the communications and signal processing track. 4. To understand key terms used in the communications systems such as noise, modulator, demodulator, and detection. 5. To perform a thorough analysis and problem solving skills learned in other classes such as EEE2210 and EEE3110 in communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding how basic communication systems work through studying AM and FM systems. 2. List the various terms associated with communication system nomenclature. 3. Identify basic hurdles facing any communication system designer. 4. Understand how information is represented, stored and transmitted. 5. Describe basic performance measures such as BER. 6. Understanding basic compression techniques. 7. Understanding basic digital communication techniques and their difference from analog communication techniques. 8. Introducing students to signal space and how it is used to represent digital signals. 9. Basic decision theory through some simple hypothesis testing and MF. 10. Understanding the interaction between random inputs and LTI-systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Basic Analog Communication Systems</u> The first part of the class that spans about 7 lectures concerns with basic analog communication systems with some quantization and some

	probability theory and basic linear time invariant systems review with applications in communication systems. [28 hrs] Part B – Introduction to Digital Communication Systems This part spans about 6 weeks and introduces students to basic tools and methods in digital communication systems. In particular, it introduces topics such as LTI systems with random inputs, decision theory, BER and optimum receiver design. [24 hrs] Note that there is a 2-hour lab each week with a lab-assignment that students have to complete by the next lab meeting to enhance and enforce students' understanding to the material given in the class.
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1,2,3,4,9, and 10
	Assignments	2	10% (10)	2, 12	LO # All except 9
	Projects / Lab.	1	20% (10)	Continuous	

	Report	N/A	N/A	N/A	N/A
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Linear Systems Review
Week 2	AM Modulation/Demodulation/Receivers
Week 3	FM Modulation/Demodulation/Receivers
Week 4	Noise Characterization / Noise in AM and FM Systems
Week 5	Sampling and PAM / Probability Review
Week 6	Simple Quantization
Week 7	Mid-term Exam
Week 8	Delta Modulation / Adaptive Modulation
Week 9	Basic Stochastic Processes
Week 10	Gaussian Processes and LTI-Systems
Week 11	Orthogonality and Signal Space
Week 12	Matched Filters / Hypothesis Tests
Week 13	Optimum Receivers 1
Week 14	Optimum Receivers 2
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 3	Lab 1: Introduction to Analog Modulation
Week 4	Lab 2: AM Modulation and Demodulation
Week 5	Lab 3: Frequency Modulation and Demodulation
Week 6	Lab 4: PAM Modulation and Demodulation

Week 7	Lab 5: PW Modulation and Demodulation
Week 8	Lab 6: Simple Quantization
Week 9	Lab 7: More Advanced Quantization Techniques (Non Uniform Quantization)
Week 10	Lab 7: Introduction to Digital Communications Modulation and Demodulation
Week 11	Lab 8: ASK Modulation and Demodulation
Week 12	Lab 9: PSK Modulation and Demodulation
Week 13	Lab 10: QAM Modulation and Demodulation
Week 14	Lab 11: MF

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Fundamentals of Communication Systems by J. Proakis and M. Salehi	Online
Recommended Texts	Contemporary Communications Systems by Matlab by J. Proakis and M. Salehi	Online
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria

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	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	POWER SYSTEM ANALYSIS	**Module Delivery**	
Module Type	ELECTIVE	**Theory ✓** **Lecture** **Tutorial ✓** **Practical** **Seminar**	
Module Code	EEE 3230		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIII	**Semester of Delivery**	6
Administering Department	Electrical & Electronics Dept	**College**	College of Engineering
Module Leader	M.Sc. Mustafa Jameel and M.Sc. Haider Fadhel Abbas	**e-mail**	Haider.fadhel@utq.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Review Committee Approval	20/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Power Engineering (EEE 3120)	**Semester**	5
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. To understand the per unit system and how to draw the impedance diagram for the power system network as a one-line diagram for easy calculation for interconnected power system having several different voltage levels and various physical quantities such as power, voltage, current and impedance. 2. Analyzing Power Flow: One of the primary aims is to analyze the flow of electrical power within a power system, including voltage profiles, current magnitudes, and power losses. This helps in assessing the system's performance, identifying bottlenecks, and optimizing power flow for efficient operation. 3. Fault Analysis and Protection: Studying power system analysis involves understanding the behavior of the system during faults and developing skills to analyze fault currents, design protective relaying systems, and coordinate protective devices for efficient fault detection and system protection. 4. To analyze the stability of the power system under various conditions, including transient stability, small-signal stability, and voltage stability. As well study swing equation and transient stability. 5. understand the construction of relays and study the protection of power system
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	It's important to note that the level of detail and specific applications covered in this course may vary, and these learning outcomes are meant to provide a general overview of what students can expect to gain from studying these topics. 1. Per Unit System: Students will learn how the per unit system is used to normalize system quantities, such as voltage, current, and power, to a common base value. This normalization allows for simplified calculations and comparisons and learning how to convert circuit parameters, such as resistance, reactance, and impedance, into per unit values. This simplification aids in analyzing complex power systems and facilitates system design and troubleshooting.

2. Understanding Network Representation: Students will learn how to represent complex electrical networks using an admittance matrix. These techniques enable the solution of large-scale power system problems, including power flow and fault analysis.

3. Students will learn how to use the impedance matrix to model and analyze transmission lines. The impedance matrix provides a valuable tool for the analysis, planning, and operation of electrical networks. Its benefits include network analysis, power flow studies, fault analysis, stability analysis, system design and optimization, as well as transient analysis.

4. Power Flow Analysis: Students should be able to perform power flow analysis, which involves calculating the steady-state voltages, currents, and power flows in a power system. It is a fundamental technique used in electrical engineering to study and analyze the steady-state behavior of power systems. It is performed to determine the voltage magnitude, phase angles, and power flows within a network under normal operating conditions. The analysis involves solving a set of non-linear equations by using Gauss-Seidel method and Newton-Raphson method.

5. Fault Analysis: Students should learn how to analyze faults in power systems, such as short circuits and ground faults. They should understand the different fault types, their causes, and the resulting effects on system behavior. Fault analysis helps in designing protection schemes and improving system reliability. As well as students should learn different methods for analyzing faults, such as symmetrical component analysis, fault impedance calculations, and fault current calculations.

6. Stability Analysis: Students should gain an understanding of power system stability and learn how to analyze and assess the transient stability and dynamic behavior of the system. They should be able to evaluate the response of the system to disturbances and identify stability issues, such as oscillations and voltage collapse.

7. Power System Protection: Students should learn about the principles and practices of power system protection. This includes understanding protective relays, their coordination, and their application in detecting and isolating faults to minimize damage and ensure the safety and reliability of the system.

Indicative Contents المحتويات الإرشادية	1. Power Flow Analysis: Power flow analysis is used to determine the steady-state voltages, currents, and power flows in a power system. It involves solving a set of nonlinear equations to obtain the voltage magnitudes and phase angles at different nodes in the system. 2. Fault Analysis: Fault analysis deals with studying the behavior of power systems during faults, such as short circuits and ground faults. It involves analyzing fault currents, fault levels, and the response of protection devices. 3. Stability Analysis: Stability analysis examines the ability of a power system to maintain steady-state operation after a disturbance. It includes transient stability, which studies the system's behavior immediately following a disturbance, and dynamic stability, which analyzes long-term stability under small disturbances. 4. Load Flow Analysis: Load flow analysis, also known as power flow analysis, calculates the steady-state voltage and power profiles of a power system under normal operating conditions. It helps in determining the optimal operation of the system and identifying potential issues such as overloads and voltage violations. 5. Power System Protection: Power system protection deals with the design and coordination of protective devices and schemes to ensure the safety and reliability of the power system. It involves fault detection, isolation, and system restoration.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Theory Comprehension 2. Problem-Solving Approach: Power system analysis involves solving complex problems. Adopt a problem-solving approach by practicing a wide range of problem sets that cover different aspects of power system analysis. This helps in developing analytical skills and applying theoretical knowledge to practical scenarios. 3. Case Studies and Real-World Examples

	4. Group Projects and Collaborative Learning: Assign group projects or collaborative exercises that require students to work together on power system analysis tasks. This promotes teamwork, communication, and critical thinking skills. Students can exchange ideas, discuss concepts, and jointly solve complex problems, fostering a deeper understanding of power system analysis. 5. Field visits to electrical generation stations, networks, and some factories, and listening to information and advice from specialists and employees

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	N/A	N/A	N/A	N/A
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-9
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Per Unit System, Change of base, per-unit quantities in three-phase systems and one-line diagrams.

Week 2	Bus Admittance Matrix, Y-bus and Bus impedance matrix, Z-bus
Week 3	Balanced Three-Phase Faults, Short circuit capacity (SCC)
Week 4	Systematic Fault Analysis Using Bus Impedance Matrix
Week 5	Fundamentals of Symmetrical Components
Week 6	Sequence Networks of a loaded Generator
Week 7	Unbalanced faults, L-G fault, L-L fault, and L-L-G fault
Week 8	Continue
Week 9	Mid Term Exam
Week 10	Introduction- Load Flow Analysis, Gauss-Seidel, and Newton-Raphson Methods of Power Flow solution
Week 11	Introduction-Power System Stability, Stability limits and Power Transmission Capability, Steady –State Stability Criterion, Transient Stability and Swing Equation
Week 12	Continue
Week 13	Introduction-Power System Protection, Zone of protection, Logical Design of Relays, Primary and Back up protection, Transmission Line Protection and Protection of Transformers
Week 14	Continue
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**1-Power system analysis by Hadi Saadat** **2-Elements of power system analysis by William D. Stevenson**	Yes
Recommended Texts	**Electrical Power System by Ashfaq Husain**	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Digital Signals Processing			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEE 3240				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	6	
Administering Department	EEE		**College**	ENG	
Module Leader	Hussein Nasser Wazeer		**e-mail**	Hussein-n@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 2210	**Semester**	4
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Identify discrete time systems and signals. 2. Define sampling theory and sampling and hold process for ADC stages. 3. Define the linear time invariant (LTI) systems and their properties. 4. Identify the impulse and step responses for LTI systems and their properties. 5. Define the time domain analysis of LTI systems using convolution. 6. Define the solving of Linear Constant Coefficient Difference Equations (LCCDE). 7. Determination of LTI system response by solving their LCCDE. 8. Representation of LTI system using direct from I and direct form II. 9. Frequency domain analysis of LTI systems 10. Time to frequency transformation through DFT, DTFT, DTFS, and z- transform. 11. Digital filters design (FIR and IIR).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the discrete signals and systems. 2. Understand the correlation and convolution with random and deterministic signals for LTI systems analysis. 3. Understand time domain analysis of LTI systems using LCCDE and Convolution. 4. Understand Fourier Transforms (DTFT, DFT, FFT, and DTFS), and how to use then in frequency domain analysis of LTI systems. 5. Understand the design of digital filters (FIR and IIR).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. PART (A): Single phase systems Single phase systems analysis theories and their power calculation, phasor analysis, complex power, power factor and power factor correction, and maximum power transfer. Magnetically coupled networks, mutual inductance, energy analysis, ideal and linear transformers. Variable frequency network performance, variable frequency response analysis, resonance circuits, filter networks, Bode plots. Two port networks, (admittance, impedance, hybrid, and transmission parameters, conversions among different parameters types. The Laplace transform and its application, definition, singularity functions, transform pairs and properties, inverse Laplace, circuit elements, analysis and synthesis techniques. –Operational amplifiers

	PART (A): Three phase systems Three phase system analysis and phasor diagrams, Star-Delta connections, power in three phase systems, overall power factor, transmission efficiency.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In class lectures, online lectures, tutorials, discussions and solving problems related to the curriculum, brain storming problems.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	15% (15)	5, 10	LO #1, 2, 10, and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6, and 9
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 9 and 11
Summative assessment	**Midterm Exam**	2 hr	15% (15)	7	LO # 1-8
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Course introduction and overview
Week 2	Signals and systems and their properties
Week 3	Sampling process and Shannon sampling theory
Week 4	Convolution and Correlation
Week 5	Time domain analysis (Convolution)
Week 6	Time domain analysis (LCCDE)
Week 7	Frequency domain representation of DT signals
Week 8	The z-transform, its properties, and its inverse
Week 9	Fourier Transforms (DTFT, DFT, FFT) and frequency response.
Week 10	Direct form I and Direct for II for LTI system representation
Week 11	Introduction to digital filters and review of analog filter design
Week 12	Digital filter structures
Week 13	Design of digital filters FIR filters
Week 14	Design of digital filters IIR filters
Week 15	Preparatory week before the final Exam
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Signal Processing: Principles, Algorithms, and Applications, Proakis and Manolakis, Prentice Hall.	Yes
Recommended Texts		
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	LINEAR CONTROL SYSTEMS			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEE 3250				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		**Semester of Delivery**	6	
Administering Department	EEE-utq		**College**	Eng-utq	
Module Leader	Dr. Alyaa Muhsen Manati		**e-mail**	Alyaa-m@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Hussein Nasser Wazeer		**e-mail**	hussein-n@utq.edu.iq	
Review Committee Approval	21/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 2210	**Semester**	4
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. The course aims to provide students with a solid foundation in the principles and concepts of control systems. This includes introducing the fundamental components and terminology used in control systems, such as sensors, actuators, feedback, error signals, and controllers. 2. Students will apply knowledge gained in basic mathematics, physical sciences and engineering courses to derive mathematical models of typical engineering processes. 3. They will hopefully learn the role of a control engineer in multi-disciplinary teams. 4. Students are taught how to mathematically model dynamic systems using differential equations and transfer functions. 5. Teach students various analysis techniques to evaluate the performance and stability of control systems. This includes concepts such as time-domain analysis, stability criteria (such as the Routh-Hurwitz stability criterion), and steady state error analysis. 6. The course will provide an in-depth presentation of control system analysis and design tools, with emphasis on computer aided design (Matlab).		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize parts of open and closed loop control systems. 2. List the various terms associated with control system. 3. Classify different control system. 4. Define mathematical modeling and transfer function . 5. List various modeling methods. 6. Describe Block diagram techniques. 7. Apply Signal Flow graph plot. 8. Discuss State space representation. 9. Identify the first and second order system. 10. Discuss the time response for first and second order system. 11. List time response specifications. 12. Explain the stability of control system and Routh's criterion.. 13. Define steady state error for linear control system and their relationship with system type.		

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to control system Definitions, closed loop and open loop control systems 2. Introduction to control system Laplace transformation Review 3. Method of representing system model Linear system, nonlinear system, transfer functions (T.F, block diagram ,signal flow graph, and state space representation 4. Time response of control system Test signals, impulse response function, first order system, second order system, definitions of time constant, damping ratio and natural frequency, definitions of transient response specifications, impulse response, dominant poles, and time response specification of second order system, 5. Stability in control system 6. Steady- state error in unity feedback control system

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Lectures in class, solving tutorial sheets, discussions and solving technical problems related to the curriculum, brain storming problems.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	2,3,4,5, 6, 7	LO #1-6
	Assignments	2	5% (5)	6, 8	LO # 5 and 6
	Projects / Lab.		10% (10)	Continuous	
	Report				

Summative assessment	**Midterm Exam**	2 hr	15% (10)	9	LO # 1-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to control system Definitions, closed loop and open loop control systems
Week 2	Laplace transformation Review
Week 3	Method of representing system model Linear system, nonlinear system, transfer functions (T.F),
Week 4	Examples of electrical system modeling
Week 5	Block Diagram Models
Week 6	Signal Flow Graphs [SFG]
Week 7	Method of representing system model State Space (S.S)
Week 8	Relation between S.S and T.F
Week 9	Mid-term Exam + Time response of control system
Week 10	Time response of control system Test signals, impulse response function, first order system
Week 11	Time response of control system second order system, definitions of time constant, damping ratio and natural frequency, definitions of transient response specifications, impulse response, dominant poles.
Week 12	Stability using Routh's criterion
Week 13	Steady- state error in unity feedback control system
Week 14	Solving some tutorial problems and review
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab1:** Using MATLAB for Control Systems**:** Introduction to MATLAB

Week 2	**Lab 2:**Polynomials and Transfer Functions in MATLAB
Week 3	**Lab 3:**Simulink for Process Control, Introduction to Simulink
Week 4	**Lab 4:**Block Diagram Reduction
Week 5	**Lab 5**:State Space Representation with MATLAB
Week 6	**Lab 6:**Time Response of First-Order Systems
Week 7	**Lab 7:**Time Response: Second-Order Systems
Week 8	**Lab 8:**Effect of Feedback on disturbance & Control System Design
Week 9	**Lab 9:**Proportional Controller and Integral controller
Week 10	**Lab 10:**Derivative controller and PID controller

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Modern control engineering", K. Ogata, 5th Ed.	Yes
Recommended Texts	1."Modern control system", Richard C. Dorf. 2. "Linear control system analysis and design", Dazzo 3. "Automatic control system", Kuo	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	DIGITAL COMMUNICATION SYSTEMS	**Module Delivery**	
Module Type	CORE	**Theory** **Lecture** **Tutorial**	
Module Code	EEE4121		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	UGIV	**Semester of Delivery**	1
Administering Department	EEE	**College**	ER
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Dr. Ahmed A. Fadhil	**e-mail**	ahmed-abd-h@utq.edu.iq
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE3220	**Semester**	UGIII-2

Co-requisites module	None	Semester	

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

Module Aims أهداف المادة الدراسية	1. To develop a deeper understanding of communication systems and in particular digital communication systems. 2. To understand different types of communications systems at the basic level starting from the basic analog communication techniques. 3. This is an elective class that is necessary for all students in the communications and signal processing track. 4. To understand key terms used in the digital communications systems such as optimum detection, coding, channel capacity, and MIMO. 5. The class introduces students to basic information theoretic measures used in contemporary digital and wireless communication systems. 6. To perform a thorough analysis and problem solving skills learned in other classes such as EEE2210, EEE3110, and EEE3220.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. A deeper understanding into the operation and analysis of digital communication systems. 2. Detailed analysis of digital modulation and detection techniques. 3. Introduction to the concept of error correcting codes. 4. Introduction to data compression algorithms. 5. Introduction to information theoretic measures. 6. Understanding the basic calculations of the channel capacity. 7. Understanding basic MIMO systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Note that since this is an undergrad class, the math level is kept at minimum. A similar grad class can be based on this class but with more emphasize on the mathematical analysis. <u>Part A – Basic Digital Communication Systems</u> The first part of the class that spans about 5 lectures concerns with basic digital communication systems beyond what is covered in EEE3220 where the concepts of coherent and Noncoherent detection are introduced. [20 hrs]

	Part B – Introduction to Error Correcting Codes This part spans about 4 weeks and introduces students to basic tools and methods used for error correction codes. [16 hrs] Part C – Introduction to Information Theory The last five weeks of the class are dedicated to information theoretic measures in digital communications with emphasizing important concepts such as their use in data compression and in understanding the channel capacity. The final class is dedicated to introduce students to basic MIMO communications. [20 hrs] Note that there is a 1-hour tutorial each week to enhance and enforce students' understanding to the material covered in the class.
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1,2,3, and 4
	Assignments	2	10% (10)	2, 12	LO # All except 6 and 7
	Projects	1	20% (10)	Continuous	

	Report	N/A	N/A	N/A	N/A
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and Review to Signal Spaces
Week 2	Baseband and Passband signaling
Week 3	Introduction to Optimum Receivers and Detection Theory
Week 4	Coherent and Noncoherent Detection
Week 5	Error Correcting Codes 1: Parity Check Codes / Linear Block Codes
Week 6	Error Correcting Codes 2: Cyclic Codes / Convolutional Codes
Week 7	Mid-term Exam
Week 8	Error Correcting Codes 3: Reed-Solomon Codes / Concatenated Codes
Week 9	Modulation and Coding Trade-Offs
Week 10	Information Theory 1: Entropy, Relative Entropy, and Mutual Information
Week 11	Information Theory 2: Data Compression / Kraft Inequality and Huffman Codes
Week 12	Information Theory 3: Channel Capacity-1
Week 13	Information Theory 3: Channel Capacity-2
Week 14	Introduction to Simple MIMO Systems
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Communications: Fundamentals and Applications by B. Sklar	Yes
Recommended Texts	Digital Communication Systems by J. Proakis and M. Salehi Fundamentals of Wireless Communication, by D. Tse and P. Viswanath Contemporary Communications Systems by Matlab by J. Proakis and M. Salehi	Online
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	FEEDBACK CONTROL SYSTEMS			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEE 4151				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	4		**Semester of Delivery**	7	
Administering Department	EEE.utq		**College**	Eng.utq	
Module Leader	Dr. Alyaa Muhsen Manati		**e-mail**	alyaa-m@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Hussein Nasser Wazeer		**e-mail**	hussein-n@utq.edu.iq	
Review Committee Approval	21/06/2023		**Version Number**	1.0	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE 3250	**Semester**	6
Co-requisites module	None	**Semester**	

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

Module Aims أهداف المادة الدراسية	1. Equip students with the necessary analytical and design techniques used in feedback control systems. This involves learning about frequency response analysis, time domain analysis, root locus techniques, and the design of Proportional-Integral-Derivative (PID) controllers. 2. Teach students about stability analysis and robustness considerations in feedback control systems. Students will explore stability criteria, such as the Routh-Hurwitz stability criterion and the Nyquist stability criterion, as well as techniques to improve stability margins and robustness against uncertainties. 3. Provide students with knowledge and skills related to controller design for feedback control systems. This includes designing controllers using different methods such as classical control techniques (e.g., PID controllers) and modern control techniques (e.g., state-space control). 4. Through assignments, projects, and exams, the course aims to develop students' problem-solving and critical thinking skills. Students should be able to analyze complex control system 5. Provide students with a strong foundation in control system theory, develop their analytical and design skills, and prepare them for future applications in engineering, automation, and related fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Students will learn to use root locus techniques to analyze the dynamic behavior of feedback control systems in time domain. 2. Improve the dynamic behavior of feedback control systems using root locus through control system design. 3. Use root locus to estimate the stability of the system. 4. Learn basic type of controller and their transfer function, structure, advantage, and disadvantage. 5. Explain and discuss the frequency response of feedback control system. 6. List different frequency response graphs. 7. Sketch polar plot for feedback control system. 8. How to draw Nyquest plot and conclude the stability from it. 9. Plot Bode plot for feedback control system and determine the stability. 10. Sketch Nichols chart for feedback control system. 11. Learn compensator (lead-lag) design that meet specific

	performance requirements using root locus. 12. Explore frequency domain compensator (lead-lag) design using Bode plot. 13. Design PID-controller using pole placemen techniques. 14. Explain state feedback controller method to improve system performance, disturbance rejection, and robustness. 15. Explain discrete control system.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Root locus tool; definition, properties, how to sketch root locus, use the root locus to design a parameter value to meet a transient response specification for systems of order 2 and higher. [12 hrs]. 2- Revision problem classes [4 hrs] 3- Types of controller; Proportional controller, Integral controller, PI-controller, D-controller, PD-controller, PID-controller. [4 hrs] 4- Frequency response analysis; definition, polar plot, Nyquest criterion for stability, Bode plot, Nichols chart. [15 hrs] 5- Compensator Design using root locus; Lead compensator, lag-compensator, Lead-lag Compensator. [8 hrs] 6- Compensator Design using Bode plot; Lead compensator, lag-compensator, Lead-lag Compensator. [8 hrs] 7- Design of PID controller; Z-N method, pole placement, state feedback, and robust control method. [12 hrs] 8- An introduction to digital control; [12hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures in class, solving tutorial sheets, discussions and solving technical problems related to the curriculum, brain storming problems.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	15% (15)	4, 5, 6, 8, 7, 9, 11	LO #1, 2, 3,4, 5, 6, 7 and 11
	Assignments	4	10% (10)	3, 6, 8,14	LO # 3, 6, and 8
	Projects / Lab.				
	Report	2	10% (10)	11, 12	LO # 9, 10, and 11, 12, 13
Summative assessment	**Midterm Exam**	2 hr	15% (15)	11	LO # 1-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction and properties of Root Locus
Week 2	Sketch of Root Locus
Week 3	Solving examples of Root Locus.
Week 4	Types of Controller
Week 5	Frequency response analysis and Polar plot
Week 6	Nyquest stability criterion
Week 7	Bode plot
Week 8	Solving examples of Bode plot
Week 9	Design Compensator using root locus (lead, lag, lead-lag)
Week 10	Design Compensator using Bode plot (lead, lag, lead-lag)
Week 11	Mid-term exam and Design of PID controller (Z-N method)
Week 12	Design of PID controller using pole placement and robust control method
Week 13	Design of PID controller using state feedback method
Week 14	Introduction to Digital control system
Week 15	**Preparatory Week**

Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Modern control engineering", 5th Ed., K. Ogata, 2010	Yes
Recommended Texts	"Automatic control system", Kuo.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	MICROPROCESSORS معالجات دقيقة			**Module Delivery**	
Module Type	ELECTIVE			**Class Lecture** **Tutorial**	
Module Code	EEE 4110				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UG IV		**Semester of Delivery**	SEVEN	
Administering Department	EEE Dept.		**College**	College of Engineering	
Module Leader	Dr. Zahraa M. Baqir		**e-mail**	Zahraam.baqer@utq.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Dr.Amean Al-Safi		**e-mail**	amean.alsafi@utq.edu.iq	
Review Committee Approval	18/6/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Digital logic	**Semester**	Three
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Provide a solid foundation in the basic concepts of microprocessors, including their architecture, components, and operation. Students will learn about the role of microprocessors in computing systems. 2. Introduce the architecture of microprocessors, including the organization of registers, instruction sets, memory addressing modes, and data movement operations. Students will gain an understanding of the internal structure and functionalities of microprocessors. 3. Cover the instruction set architecture of a specific microprocessor or a family of microprocessors. Students will learn about the different types of instructions, addressing modes, and the execution of instructions. 4. Introduce assembly language programming for the specific microprocessor being studied. Students will learn the syntax, structure, and conventions of writing assembly language programs. 5. Explore the interfaces and communication protocols used to connect microprocessors with external devices and peripherals. Students will learn about input/output (I/O) operations, interrupts, timers, and serial/parallel communication interfaces. 6. The module aims to cover the memory hierarchy and memory management in microprocessors. Students will learn about different types of memories, such as cache memory, RAM, and ROM, and their organization and access methods. 7. Enhance problem-solving skills and promote critical thinking by engaging students in analyzing and solving real-world problems using microprocessors. They will learn to apply their knowledge of microprocessor concepts to design, implement, and troubleshoot microprocessor-based systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowledge and Understanding of microprocessor architecture, components, and operation. 2. Programming Skills: Write assembly language programs for a specific microprocessor, employing the appropriate syntax, structure, and conventions. 3. Apply critical thinking skills to analyze and solve problems related to microprocessor-based systems. 4. Apply microprocessor knowledge and skills to real-world applications in areas such as embedded systems, robotics, industrial automation, and consumer electronics.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Introduction to Microprocessors: Definition and characteristics of microprocessors, Role of microprocessors in computing systems Microprocessor Architecture: Components of a microprocessor (ALU, control unit, registers, etc.), Microprocessor buses and their functions. [15 hrs] Instruction Set Architecture (ISA):Types of instructions (data movement, arithmetic, logical, control), Addressing modes and instruction formats , Assembly language programming concepts coefficients [10 hrs] Assembly Language Programming: Introduction to assembly language programming, Assembly language syntax and conventions, Writing and executing assembly language programs [10 hrs] Microprocessor Organization:Memory hierarchy (cache, RAM, ROM) Memory management (addressing, segmentation, paging) [10 hrs] Revision problem classes [10 hrs] Microprocessor Interfacing: Communication interfaces (serial, parallel, USB, etc.), Interfacing microprocessors with external devices (sensors, actuators, memory, etc.), Input/output ports and their configuration [10 hrs] Microprocessor Applications: Embedded systems and their design considerations, Robotics and automation applications, Microprocessor-based control systems [7 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 lectures, tutorials, group work, case studies, Assembly language programming assignments, simulations and virtual labs or any other relevant activities.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	3, 5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6 and 7
	Midterm Exam	1.5 hr	20% (20)	8	LO # 1-7
	Final Exam	3hr	60% (60)	16	All
Summative assessment	100% (100 Marks)				

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Microprocessors: Role, history, and applications, Microprocessor architecture overview.
Week 2	Components of a microprocessor: ALU, control unit, registers
Week 3	Addressing modes and data movement instructions.
Week 4	Arithmetic instructions (adding and subtraction)
Week 5	Arithmetic instructions (multiplication and division).
Week 6	logical instructions
Week 7	Status flags
Week 8	Mid-term Exam
Week 9	Control flow instructions and conditional branching.
Week 10	Microprocessor architecture.
Week 11	I/O operations and communication interfaces
Week 12	Memory interfacing and addressing

Week 13	Interrupts and interrupt handling mechanisms.
Week 14	Microprocessor applications in embedded systems and robotics.
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"THE INTEL MICROPROCESSORS: Architecture, Programming, and Interfacing" by BARRY B. BREY	Yes
Recommended Texts	"Microprocessor Architecture, Programming, and Applications with the 8085" by Ramesh S. Gaonkar.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	ANTENNAS & هوائيات وإنتشار موجات WAVES PROPAGATION	**Module Delivery**	
Module Type	ELECTIVE	**Theory** **Lecture** **Tutorial**	
Module Code	EEE 4120		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	UGIV	**Semester of Delivery**	UGIV
Administering Department	EEE dept	**College**	College of Engineering
Module Leader	Dr. Amean Al-Safi	**e-mail**	amean.alsafi@utq.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Msc. Ahmed Abdulredha	**e-mail**	Ahmed.Abdulredha@utq.edu.iq
Peer Reviewer Name	Dr. Amean Al-Safi	**e-mail**	amean.alsafi@utq.edu.iq
Review Committee Approval	18/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE 3121	**Semester**	Five
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand how Wave Propagate in Free Space, Dielectrics, and Good Conductors. 2. To understand Wave Power, Poynting's Theorem, Wave Polarization. 3. To understand Reflection of Uniform Plane Waves at Normal Incident. 4. To understand Standing Wave Ratio, Wave Reflection from Multiple Interfaces. 5. To understand standing plane wave propagation in general directions, plane wave plane. 6. To understand wave at oblique incident angles. 7. Understanding total Reflection and Total Transmission of Obliquely Incident Waves. 8. Understanding basic radiation principles. 9. Study of antenna specifications. 10. Study antenna array.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To solve all problems of wave propagation in free space and wave propagation in dielectrics. 2. Able to solve problems of propagation in Good Conductors. 3. Able to apply Poynting's Theorem and calculate wave power. 4. Recognize between wave polarization types. 5. Able to solve problems of reflection of uniform plane waves at normal incident. 6. Able to calculate Standing Wave Ratio and solve problems of Wave Reflection from Multiple Interfaces. 7. Able to analysis of plane wave propagation in general directions, plane wave plane wave at oblique incident angles. 8. Able to calculate of total reflection and total transmission of obliquely incident waves. 9. Able to recognize of Antenna Specifications. 10. Able to analysis of Magnetic Dipole, Thin Wire Antennas. 11. Knowledge antennas as receivers types. 12. Knowledge array antenna types and able to solve problems of this types of antennas. 13. Knowledge directivity of uniformly excited, equally spaced linear Arrays. 14. Able to solve problems of Mutual Coupling in Arrays.

	15. Able to solve problems of Multidimensional Arrays.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Course Introduction and Overview, Review of (Maxwell's equations: Faraday's Law, Displacement Current, Maxwell's equations in point form, Maxwell's equations in integral form, Retarded Potentials). Wave Propagation in Free Space, Wave Propagation in Dielectrics, Poynting's Theorem and Wave Power, Propagation in Good Conductors, Wave Polarization Reflection of Uniform Plane Waves at Normal Incident, Standing Wave Ratio, Wave Reflection from Multiple Interfaces, Plane Wave Propagation in General Directions, Plane Wave Plane Wave at Oblique Incident Angles, Total Reflection and Total Transmission of Obliquely Incident Waves. Basic Radiation Principles: The Hertzian Dipole, Antenna Specifications, Magnetic Dipole, Thin Wire Antennas, Antennas as Receivers, Introduction to Array Antennas, Arrays of Two Elements, Uniform Linear Arrays, The Array Factor for Linear Arrays, Uniformly Excited, Equally Spaced Linear Arrays The Complete Array Pattern and Pattern Multiplication, Directivity of Uniformly Excited, Equally Spaced Linear Arrays, Nonuniformly Excited, Equally Spaced Linear Arrays. Mutual Coupling in Arrays, Multidimensional Arrays
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Review of (Maxwell's equations: Faraday's Law, Displacement Current, Maxwell's quations in point form, Maxwell's equations in integral form, Retarded Potentials).
Week 2	Wave Propagation in Free Space, Wave Propagation in Dielectrics
Week 3	Poynting's Theorem and Wave Power, Propagation in Good Conductors
Week 4	Wave Polarization, Reflection of Uniform Plane Waves at Normal Incident
Week 5	Standing Wave Ratio, Wave Reflection from Multiple Interfaces
Week 6	Plane Wave Propagation in General Directions, Plane Wave Plane Wave at Oblique Incident Angles.
Week 7	Total Reflection and Total Transmission of Obliquely Incident Waves
Week 8	Basic Radiation Principles: The Hertzian Dipole, Antenna Specifications.
Week 9	Magnetic Dipole, Thin Wire Antennas, Antennas as Receivers
Week 10	Introduction to Array Antennas, Arrays of Two Elements
Week 11	Uniform Linear Arrays, The Array Factor for Linear Arrays

Week 12	Uniformly Excited, Equally Spaced Linear Arrays, The Complete Array Pattern and Pattern Multiplication.
Week 13	Directivity of Uniformly Excited, Equally Spaced Linear Arrays Nonuniformly Excited, Equally Spaced Linear Arrays
Week 14	Mutual Coupling in Arrays, Multidimensional Arrays
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- Engineering Electromagnetics (9th edition), William H. Hayt, Jr. and John A. Buck, 2018. 2- Antenna Theory and Design (3rd edition), Warren L. Stutzman, and Gary A. Thiele,2013.	Yes
Recommended Texts	1- Engineering Electromagnetics (3rd edition), Natahn Ida, 2015. 2- Elements of Electromagnetic, Mathew N.O. Sadiku, 4th edition, Oxford University Press.	No
Websites		

APPENDIX:

GRADING SCHEME
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	RESEARCH TOPICS			**Module Delivery**	
Module Type	CORE			**Practical** **Seminar**	
Module Code	EEE4130				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	4		**Semester of Delivery**	7	
Administering Department	EEE		**College**	Engineering	
Module Leader	Dr. Ahmed K. Abed		**e-mail**	ahmed.abed@utq.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	None
Co-requisites module	None	**Semester**	None
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	This course is structured to assist senior students in understanding research processes and practices and, subsequently, to prepare students for executing independent research and writing. As part of the process, students will clarify and refine a research topic area and questions. Students will explore on the context within which their topic is important through the development of a literature review that establishes precedents for each part of their project. Students will choose a set of procedures and techniques that will allow them to carry out their study. And they will create a *viable* work plan and time table for completing of their proposed research. All of these parts will be synthesized in a high-quality document, and a short presentation of the research project proposal to instructor and peers.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Understandig how can select a research topic that is related to the Electrical and electronics problems. 2-Identifying problem statement. 3-Reading a literature review about the problem statement. 4-Understanding Ethics meaning. 5-Learning presentation skills. 6- Writing a proposal for graduate project.		
Indicative Contents المحتويات الإرشادية	This course is designed to facilitate the development and writing of the Capstone Research Proposal. In conversation and consultation with peers and the instructor, students will: 1- Select and focus their capstone research topics, goals, questions, and "products" to be created; 2- Identify and read scholarly texts that inform their thinking about their topics of inquiry; 3- Learn about and plan to apply appropriate research methods; 4- Obtain permissions and agreements from site administrators and/or individuals, if needed: 5- Select their Capstone Committee, and 6- Write Capstone Research Proposals. Students will complete a significant amount of the work required in this course independently. This includes identifying, retrieving, and examining texts that will inform their individual research interests and projects, and writing in a scholarly and professional way. Through a series of both graded and ungraded weekly assignments, students will shape their capstone research plans, and by the end of this course they will turn in their written Capstone Research Proposals for		

	evaluation.
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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**		10% (0)		
	Assignments	2	20% (20)	4, 12	1,5
	Projects / Lab.	2	20% (20)	Continuous	2,4
	Report	1	10% (10)	7	3
Summative assessment	**Midterm Exam**		10% (0)		
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction: What Is Research? .
Week 2	Literature Review and Technical Reading.
Week 3	Attributions and Citations: Giving Credit Wherever Due
Week 4	Building Intellectual Property Rights
Week 5	Ethics in Engineering Research.
Week 6	Ethics in Engineering Research
Week 7	Technical Writing and Publishing
Week 8	Technical Writing and Publishing
Week 9	Research Management, Planning and Collaboration
Week 10	Research Management, Planning and Collaboration
Week 11	Research Management, Planning and Collaboration
Week 12	Communicating Research Work: Presentation Skills
Week 13	Communicating Research Work: Presentation Skills
Week 14	Communicating Research Work: Presentation Skills
Week 15	Communicating Research Work: Presentation Skills
Week 16	**Final presentation Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	
Week 3,4	
Week 5,6	
Week 7,8	
Week 9,10	
Week 11,12	
Week13,14	
Week15,16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Deb, D., Dey, R., & Balas, V. E. (2019). Engineering research methodology. A Practical Insight for Researchers, 153.	Yes
Recommended Texts	Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.	yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar Faculty of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	RENEWABLE ENERGY	**Module Delivery**	
Module Type	Elective learning activity	**Class Lecture** **Tutorial**	
Module Code	EEE 4210		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	4	**Semester of Delivery**	8
Administering Department		**College**	
Module Leader	Ali Salam Al-Khayyat	**e-mail**	Ali-al-khayyat@utq.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval		**Version Number**	1

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of studying renewable energy in electrical engineering is to equip students with the knowledge, skills, and understanding necessary to address the challenges and opportunities presented by renewable energy sources in the field of electrical engineering. The specific aims include: 1. Understanding Renewable Energy Technologies: Studying renewable energy in electrical engineering allows students to gain a comprehensive understanding of various renewable energy technologies such as solar, wind, hydro, geothermal, and biomass. Students learn about the principles, operation, components, and characteristics of these technologies, enabling them to analyze, design, and implement renewable energy systems. 2. Sustainable Energy Generation: Renewable energy plays a critical role in achieving a sustainable and low-carbon future. By studying renewable energy, electrical engineering students gain insight into the environmental, social, and economic benefits of utilizing renewable energy sources. They learn how to assess renewable energy resources, evaluate their potential, and contribute to the development of sustainable energy generation solutions. 3. Integration of Renewable Energy into Power Systems: Integrating renewable energy sources into existing power systems presents unique challenges. Electrical engineering students studying renewable energy explore concepts related to the grid integration of renewable energy, including power system stability, control, and grid interconnection. They gain knowledge of power electronics, energy storage, and advanced control systems required for efficient and reliable integration of renewable energy sources. 4. Design and Optimization of Renewable Energy Systems: Studying renewable energy in electrical engineering enables students to design and optimize renewable energy systems. They learn about system modeling, simulation, and analysis techniques specific to renewable energy applications. This knowledge helps them assess system performance, improve energy conversion efficiency, and optimize the sizing and operation of renewable energy systems.

	5. Policy and Economic Considerations: Renewable energy is influenced by policy frameworks, government incentives, and economic factors. Electrical engineering students studying renewable energy gain an understanding of renewable energy policies, regulatory frameworks, and economic analysis techniques. This knowledge allows them to evaluate the feasibility, profitability, and impact of renewable energy projects and contribute to policy development. 6. Innovation and Future Directions: Renewable energy technologies continue to evolve rapidly. By studying renewable energy, electrical engineering students stay abreast of emerging trends, advanced technologies, and research advancements in the field. They are encouraged to explore innovative approaches, develop new solutions, and contribute to the future development and adoption of renewable energy technologies.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Studying renewable energy in electrical engineering can lead to the achievement of various learning outcomes. These outcomes are designed to equip students with the knowledge, skills, and competencies necessary to work effectively in the field of renewable energy. Here are some typical learning outcomes associated with studying renewable energy in electrical engineering: 1. Knowledge of Renewable Energy Technologies: Students will develop a comprehensive understanding of different renewable energy technologies, including their principles, operation, components, and characteristics. They will be familiar with solar, wind, hydro, geothermal, and biomass energy systems. 2. Understanding of Renewable Energy Integration: Students will gain knowledge about the integration of renewable energy into existing power systems. They will understand the challenges, grid interconnection requirements, and stability considerations associated with integrating renewable energy sources into the electrical grid. 3. Competence in Renewable Energy System Design: Students will acquire the skills necessary to design and optimize renewable energy systems. They will be able to analyze energy resources, select appropriate technologies, size system components, and optimize system performance using modeling and simulation tools.

	4. Proficiency in Energy Conversion and Power Electronics: Students will develop a solid understanding of energy conversion processes and power electronics relevant to renewable energy systems. They will be able to analyze and design power electronic converters, control systems, and energy storage solutions for efficient and reliable renewable energy integration. 5. Ability to Evaluate Economic and Policy Factors: Students will be able to evaluate the economic viability of renewable energy projects and analyze the impact of policy frameworks and incentives on renewable energy adoption. They will understand the economic analysis techniques, market dynamics, and regulatory aspects related to renewable energy. 6. Familiarity with Energy Management and Grid Resilience: Students will learn about energy management strategies, demand response techniques, and grid resilience in the context of renewable energy integration. They will understand the importance of energy management systems and be able to contribute to the development of efficient and resilient electrical power systems. 7. Research and Problem-Solving Skills: Students will develop research skills, enabling them to critically evaluate existing renewable energy technologies and contribute to the development of innovative solutions. They will be able to analyze complex problems, propose feasible solutions, and apply analytical and problem-solving skills in the renewable energy domain. 8. Awareness of Sustainability and Environmental Considerations: Students will recognize the importance of sustainability and environmental impacts associated with renewable energy. They will be familiar with life-cycle assessment methods, environmental regulations, and sustainable practices in the renewable energy sector. 9. Effective Communication and Collaboration: Students will develop effective communication skills, enabling them to convey technical concepts and findings related to renewable energy to various audiences. They will also develop collaboration skills, working effectively as part of multidisciplinary teams involved in renewable energy projects.

Indicative Contents المحتويات الإرشادية	1. Introduction to Renewable Energy Sources ❖ Overview of renewable energy technologies (solar, wind, hydro, geothermal, biomass) ❖ Comparison of renewable energy sources with conventional energy sources ❖ Environmental, social, and economic considerations 2. Solar Energy ❖ Solar radiation and its measurement ❖ Photovoltaic (PV) systems: principles, components, and operation ❖ Solar cell technologies and characteristics ❖ PV system modeling, sizing, and performance analysis ❖ Grid-connected and standalone PV systems 3. Wind Energy ❖ Wind energy basics and resource assessment ❖ Wind turbine types and components ❖ Aerodynamics of wind turbine blades ❖ Wind turbine control systems ❖ Grid integration and power quality considerations 4. Hydroelectric Power ❖ Hydroelectric power generation principles ❖ Types of hydroelectric power plants (impoundment, run-of-river, pumped storage) ❖ Components of hydroelectric power plants (turbines, generators, penstocks) ❖ Small-scale hydroelectric systems and microgrids 5. Geothermal Energy ❖ Geothermal energy sources and characteristics ❖ Geothermal power generation technologies (dry steam, flash steam, binary cycle) ❖ Geothermal reservoir assessment and exploration techniques ❖ Environmental and sustainability aspects of geothermal energy 6. Biomass Energy ❖ Biomass energy conversion processes (combustion, gasification, fermentation) ❖ Biomass feedstocks and their properties ❖ Biogas production and utilization ❖ Bioenergy sustainability and environmental impacts

	7. Integration and Grid Interconnection ❖ Power system integration of renewable energy sources ❖ Distributed generation and smart grid concepts ❖ Power electronics for renewable energy integration ❖ Grid codes, standards, and regulations 8. Energy Storage for Renewable Energy Systems ❖ Energy storage technologies (batteries, pumped hydro, compressed air, flywheels) ❖ Energy storage system operation and control ❖ Role of energy storage in renewable energy integration ❖ Economic and technical considerations for energy storage 9. Renewable Energy Policies and Economics ❖ Government policies and incentives for renewable energy ❖ Renewable portfolio standards and feed-in tariffs ❖ Economic analysis of renewable energy projects ❖ Life-cycle assessment and cost-benefit analysis 10. Emerging Trends and Future Directions ❖ Advanced renewable energy technologies (tidal, wave, solar thermal, etc.) ❖ Energy management and demand response ❖ Grid resilience and renewable energy integration ❖ Research and innovation in renewable energy
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When teaching renewable energy in electrical engineering, it is important to employ effective strategies that engage students, promote active learning, and enhance their understanding of the subject matter. Here are some strategies that can be used: 1. Conceptual Framework: Start by providing students with a conceptual framework of renewable energy, including an overview of different technologies, their advantages and limitations, and their role in sustainable energy systems. This will give students a solid foundation and a big-picture understanding before diving into specific topics. 2. Real-World Examples and Case Studies: Incorporate real-world examples and case studies of renewable energy projects and systems. This can include showcasing successful implementations, highlighting challenges faced, and discussing lessons learned. Analyzing real-world scenarios helps students relate theoretical concepts to practical applications.

	3. Hands-on Experiments and Demonstrations: Provide students with hands-on experiences through laboratory experiments and demonstrations. This can involve setting up small-scale renewable energy systems, conducting measurements, and analyzing data. Hands-on activities enhance understanding, promote critical thinking, and reinforce theoretical concepts. 4. Simulation and Modeling Tools: Utilize simulation and modeling tools specific to renewable energy systems. This allows students to simulate and analyze the performance of various renewable energy technologies, evaluate system designs, and assess different operating conditions. Software tools such as MATLAB/Simulink, PSCAD, or HOMER can be used. 5. Group Projects and Problem-Based Learning: Assign group projects that require students to work collaboratively on real-world renewable energy challenges. These projects can involve system design, feasibility studies, or performance evaluations. Problem-based learning approaches encourage teamwork, critical thinking, and practical problem-solving skills. 6. Interactive Discussions and Debates: Encourage interactive discussions and debates on renewable energy topics. This can involve exploring different perspectives, discussing the benefits and challenges of renewable energy adoption, and examining the trade-offs between various technologies. Encourage students to critically analyze and defend their viewpoints. 7. Continuous Assessment and Feedback: Implement continuous assessment methods, such as quizzes, assignments, and projects, to gauge students' understanding and progress. Provide prompt feedback to help students identify areas of improvement and reinforce their learning. 8. Integration of Sustainability and Ethics: Highlight the importance of sustainability and ethical considerations in renewable energy. Discuss topics such as environmental impacts, social equity, and the ethical responsibilities of engineers working in the renewable energy sector. This helps students develop a holistic perspective on renewable energy.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Renewable Energy Sources • Overview of renewable energy technologies • Comparison with conventional energy sources • Environmental and economic considerations
Week 2	Solar Energy • Solar radiation and measurement • Photovoltaic (PV) systems: principles and operation
Week 3	Solar Energy (continued) • Solar cell technologies and characteristics • PV system modeling and performance analysis
Week 4	Wind Energy • Wind energy basics and resource assessment • Wind turbine types and components
Week 5	Wind Energy (continued) • Aerodynamics of wind turbine blades • Wind turbine control systems
Week 6	Hydroelectric Power • Hydroelectric power generation principles • Types of hydroelectric power plants
Week 7	Hydroelectric Power (continued) • Components of hydroelectric power plants • Small-scale hydroelectric systems
Week 8	Geothermal Energy • Geothermal energy sources and characteristics • Geothermal power generation technologies
Week 9	Biomass Energy • Biomass energy conversion processes • Biomass feedstocks and properties
Week 10	Integration and Grid Interconnection • Power system integration of renewable energy • Distributed generation and smart grid concepts
Week 11	Energy Storage for Renewable Energy Systems • Energy storage technologies • Energy storage system operation and control
Week 12	Renewable Energy Policies and Economics • Government policies and incentives • Economic analysis of renewable energy projects
Week 13	State-of-the-Art Technologies and Emerging Trends • Tidal, wave, and solar thermal energy technologies • Energy management and demand response

Week 14	Sustainability and Environmental Considerations • Life-cycle assessment and environmental impacts • Sustainable practices in renewable energy
Week 15	Review and Future Directions • Recap of key concepts and topics covered • Discussion on research advancements and future directions
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. "Renewable Energy Systems: A Smart Energy Systems Approach to the Choice and Modeling of 100% Renewable Solutions" by Henrik Lund. 2. "Renewable and Efficient Electric Power Systems" by Gilbert M. Masters. 3. "Wind Energy Explained: Theory, Design, and Application" by James F. Manwell, Jon G. McGowan, and Anthony L. Rogers. 4. "Solar Engineering of Thermal Processes" by John A. Duffie and William A. Beckman. 5. "Hydroelectric Energy: Renewable Energy and the Environment" by Bikash Pandey. 6. "Introduction to Geothermal Power" by Kurtis C. Burmeister and Ronald DiPippo. 7. "Biomass for Renewable Energy, Fuels, and Chemicals" by Donald L. Klass. 8. "Grid Integration and Dynamic Impact of Wind Energy" by Ning Zhang and Jin Yang. 9. "Energy Storage for Renewable Energy Integration: Theory and Practice" by Gabriela C. Hug and S. R. Doradla.	?

	10. "Renewable Energy Finance: Powering the Future" by Charles W. Donovan.	
Recommended Texts	"Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle, Third Edition, 2012.	?
Websites	1. National Renewable Energy Laboratory (NREL) - The official website of NREL, a U.S. Department of Energy laboratory focused on advancing renewable energy technologies. It provides research publications, technical reports, data sets, and educational resources: https://www.nrel.gov/ 2. International Renewable Energy Agency (IRENA) - IRENA is an intergovernmental organization dedicated to promoting renewable energy worldwide. Their website offers reports, analysis, and publications on various renewable energy topics: https://www.irena.org/ 3. Renewable Energy World - A leading source of news and information on renewable energy technologies, policies, projects, and industry trends. It covers a wide range of renewable energy topics and provides insightful articles and interviews: https://www.renewableenergyworld.com/ 4. Energy.gov - The website of the U.S. Department of Energy provides extensive resources on renewable energy technologies, research, and initiatives. It offers educational materials, reports, and access to energy data: https://www.energy.gov/ 5. European Renewable Energy Research Centres Agency (EUREC) - EUREC is an association of European renewable energy research centers. Their website provides information on research projects, publications, and educational resources related to renewable energy: https://www.eurec.be/	

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING ETHICS			**Module Delivery**	
Module Type	SUPLEMENT			**Theory** **Lecture** **Tutorial** **Seminar**	
Module Code	ER 401				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Msc. Riham Ali Zbaid		**e-mail**	eng.riham@utq.edu.iq	
Module Leader's Acad. Title	Assistant teacher		**Module Leader's Qualification**	Msc	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	17/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The engineering ethics curriculum aims to introduce students to the concept of engineering ethics, to learn why it is important to study engineering ethics, to understand the distinction between professional and personal ethics, and to know how ethical problem-solving and engineering design are similar. Find out if engineering is a profession, understand what the codes of ethics are, and study some of the codes of ethics of professional engineering societies. The student is also introduced to the concept of management and the activities carried out by individuals to undertake the necessary actions for the purpose of achieving goals. In addition to discussing production, ways to develop it, its types, and how to achieve optimal efficiency in production management. Also, in this topic, the selection of the most suitable sites for the factory and its planning is discussed by studying the factors affecting its selection using the break-even point in the comparison between the types of planning.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. During the semester, the student learns the concept of engineering ethics and the reason for the importance of studying engineering ethics. 2. The student learns to distinguish between professional and personal ethics. 3. The student learns how to identify ethical problem-solving and engineering design. 4. The student learns how engineering is a profession and compares it with other professions such as medicine and law. 5. The student learns codes of ethics, and studies some codes of ethics for professional engineering societies. 6. During the academic year, the student learns an idea about engineering and scientific management and its relationship with the concept of industrial engineering and with other sciences, and learns about its duties in addition to marketing and marketing activities for the product.
Indicative Contents المحتويات الإرشادية	

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.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.35
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.21
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.				
	Report		10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1-3	Introduction to the ethical and professional responsibilities and develops engineering skills
Week 4-6	The Engineer and engineering disciplines, Engineering Ethics Problem Solving, Introduction to engineering design, Engineering Communications Literature search skills
Week 7-10	Code of Ethics, Types of Codes of Ethics
Week 11-15	Definition of management, management duties, scientific management, management and other sciences, deployment activities, advertisements, products transfer, products storing, financial resources and risks, production factors, types of productions, markets, incomes and costs of productions.
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Engineering Ethics, 4th Edition, Charles B., (2011) • الهندسة الصناعية , تأليف: د. عادل عبد المالك	Yes
Recommended Texts		
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	MICROCONTROLLERS APPLICATIONS	**Module Delivery**	
Module Type	ELECTIVE	**Theory** **Lecture** **Lab** **Tutorial** **Practical**	
Module Code	EEE 4220		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	4	**Semester of Delivery**	8
Administering Department	EEE	**College**	Engineering
Module Leader	Dr. Ahmed K. Abed	**e-mail**	ahmed.abed@utq.edu.iq
Module Leader's Acad. Title	Asst. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	None
Peer Reviewer Name	None	**e-mail**	None
Review Committee Approval	01/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	ER207	**Semester**	3
Co-requisites module	None	**Semester**	None
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. The course aims to introduce students and teach them the main components of microcontrollers, structural architecture, and most important function in industrial, medical, and scientific applications. 2. The course aims to introduce the student to the most important computer programs that deal with microcontrollers for the purpose of starting the design process according to the requirements of the engineering project. 3. The course aims to learn how to program in C-language and how to deal with the components of the STM32Fxxx microcontrollers. 4. The course also aims to familiarize the student with reading the accompanying catalog with each type of microcontrollers and reading the data correctly so that the student can use these data for choosing the right design to implement the engineering projects.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the difference between microprocessors and microcontrollers. 2. Learn how to configure the microcontrollers through the computer programs that are installed on the computer after requesting it from the manufacturer of the developed boards. 3. Identifying the general input and output terminals of GPIO and how to configure them in accordance with the type of project, and control the status data through the operating program that are written in C. 4. Learn about setting the clock of the main system and its associated components. 5. Initializing TIMERS and how to change their properties through programming or setting and adjusting the clock pulses controlling these Timers. 6. Study all types of these timers and how to use them to generate PWM to control motors. 7. Studying and programming analogue signal converters to ADC digital signal, how to set and configure this type on microcontrollers, knowing their types and how each type of these types works. 8. Studying the digital-to-analogue DAC converter, how to adjust and configure this type on microcontrollers, knowing their types, and how		

	each of these types work. 9. The student is given a weekly project for the purpose of carrying out the required project on the available laboratory equipment. 10. This course also aims to help the student to deal with embedded systems, regardless of their type, through a correct reading of their physical components, an accurate description of the data, and how to optimally employ them.
Indicative Contents [73h] المحتويات الإرشادية	The primary emphasis of the course will be microcontroller architecture, firmware and embedded software design. In addition, hardware interface design issues will also be extensively covered. Students are expected to show expertise in both areas. Topics to be tentatively covered in this course include: - Introduction to the ARM Cortex-M Microcontroller Family • Introduction to STM32CubeMX. [2h] • Introduction STMStudio [2h] • ARM Cortex-M4 Architecture and Memory Map. [4h] • ARM Cortex-M4 Programmer's Model. [4h] • C Programming with the Keil uVision Work Bench. [4h] • Interfacing to the Parallel I/O Ports. [10h] • Interrupts and interrupt service routines. [8h] • Programming the Timer Module. [6h] • Input Capture and Output Compare. [6h] • Programming the PWM Module. [6h] • Analog to Digital Converter (ADC). [6h] • Digital to Analogue Converter (DAC). [5h] • SPI Interface. [2h] • Asynchronous Serial Communications Interface. [2h] • CAN Interface (if time permits) [4h] • I2C Interface (if time permits) [2h]
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. Also, this class will deliver a good experience for students who are looking for a job in industrial and medical sectors.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	108	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3, 6	LO #3, 6, and 10
	Assignments	2	10% (10)	4, 12	LO # 3, 4, 6, and 10
	Projects / Lab.	2	15% (15)	Continuous	
	Report	0	10% (0)		
Summative assessment	**Midterm Exam**	2 hr	15% (15)	10	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction on Embedded systems and Microcontrollers
Week 2	Introduction on Embedded systems and Microcontrollers
Week 3	GPIO and clock diagram
Week 4	GPIO and clock diagram
Week 5	GPIO and clock diagram
Week 6	Kind of Timers (IC, Basic Timers, PWM)
Week 7	Kind of Timers (IC, Basic Timers, PWM)
Week 8	Kind of Timers (IC, Basic Timers, PWM)
Week 9	Project I
Week 10	Internal and external interrupts
Week 11	Project II
Week 12	Rotary Encoder and Ultrasonic Transceiver.
Week 13	Analogue to digital converter (ADC) and Digital to Analogue Converter (DAC)
Week 14	Project III
Week 15	Communication Protocols

Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر **[2hr/w]**	
	Material Covered
Week 1,2	Lab 1 Introduction on Embedded systems and Microcontrollers How install STM32CubeMX, or STM32CubeIDE (recommended)
Week 3,4	GPIO and clock diagram
Week 5,6	Kind of Timers (IC, Basic Timers, PWM)
Week 7,8	Project I (GPIO)
Week 9,10	Internal and external interrupts
Week 11,12	Project II (External interrupts, Timer design, & Rotary Encoder)
Week 13,14	ADC and DAC
Week 15	Project III (ADC + DAC)
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Yifeng Zhu, "Embedded Systems with ARM Cortex-M Microcontrollers in Assembly Language and C," 2018,3rd edition.	Yes
Recommended Texts	Jonathan Valvano, Embedded Systems: Real-Time Interfacing to ARM® Cortex TM-Microcontrollers, Volume 2, 5th Ed., 2017, ISBN-13: 978-1463590154, ISBN-10: 1463590156, available in the University Bookstore, Bernhard Center.	No
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note:

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	POWER ELECTRONICS		**Module Delivery**	
Module Type	ELECTIVE			**Theory** **Lab** **Tutorial** **Report**
Module Code	EEE 4230			
ECTS Credits	7			
SWL (hr/sem)	175			
Module Level	UGIV	**Semester of Delivery**	8	
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Dr. Hayder Andulhasan Abdulrahem	**e-mail**	h.abdulrahem@utq.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	None	**e-mail**	None	
Peer Reviewer Name		**e-mail**		
Review Committee Approval	14/06/2023	**Version Number**	1.0	

Relation With Other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	EEE 2222- EEE 2110	**Semester**	3-, 4
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To provide students with a comprehensive understanding of the principles and concepts of power electronics. 2. To develop students' ability to analyze and solve problems related to power electronics circuits and systems. 3. To enable students to design and implement power converters for various applications. 4. To foster critical thinking and analytical skills in evaluating the performance and efficiency of power electronic devices and circuits 5. To familiarize students with the challenges and limitations of power electronics technology and encourage innovative thinking for overcoming them. 6. To emphasize the importance of safety measures and considerations in power electronics design and implementation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the fundamental concepts and principles of power electronics. 2. Relate basic semiconductor physics to properties of power devices, and combine circuit 3. mathematics and characteristics of linear and non-linear devices 4. Analyze and solve basic power electronics circuits and systems. 5. Design and implement power converters for various applications. 6. Analyze the impact of power electronics on power quality and efficiency. 7. Identify and analyze the challenges and limitations of power electronics technology. 8. Apply safety measures and considerations in power electronics design and implementation.
Indicative Contents المحتويات الإرشادية	Introduction to Power Electronics • Overview of power electronics and its applications • Classification of power electronic converters • Power semiconductor devices: diodes, transistors, and thyristors Power Semiconductor Devices • Characteristics and ratings of power devices • Diode and thyristor circuits and applications • Power MOSFETs and IGBTs Power Converters and AC-DC Rectifiers • Single-phase and three-phase diode rectifiers • Control techniques for rectifiers • Power factor correction techniques DC-DC Converters • Buck, boost, and buck-boost converters

	• Analysis and control of DC-DC converters • Pulse-width modulation (PWM) techniques Inverters • Single-phase and three-phase inverters • Pulse-width modulation (PWM) techniques for inverters • Voltage control and harmonic elimination AC-AC Converters • Cycloconverters • Voltage and frequency control Motor drives and control • Three-phase PMSM speed control
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Lectures: Conduct regular lectures to introduce and explain the theoretical concepts, principles, and analytical techniques of power electronics. Use visual aids, demonstrations, and real-life examples to enhance understanding. 2. Laboratory Sessions: Organize laboratory sessions where students can apply their knowledge by working with power electronic components, circuits, and simulation software 3. Problem-Solving Exercises: Assign problem sets and exercises that require students to analyze and solve power electronics problems. Encourage students to think critically, apply appropriate methodologies, and present their solutions effectively. 4. Computer Simulations: Utilize computer simulations and modeling tools to simulate and analyze power electronics circuits and systems. This will enable students to explore different design options, evaluate performance, and understand the impact of various parameters. 5. Online Resources: Provide access to online resources such as textbooks, research papers, and educational videos to supplement classroom learning. Encourage students to explore these resources to deepen their understanding of power electronics concepts. 6. Formative and Summative Assessments: Conduct regular formative assessments, such as quizzes and in-class exercises, to gauge students' understanding and provide timely feedback. Additionally, administer summative assessments, to evaluate students' overall knowledge and skills.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem)	108	**Structured SWL (h/w)**	7

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Power Electronics
Week 2	Power Semiconductor Devices
Week 3	Power Converters and AC-DC Rectifiers (1)
Week 4	Power Converters and AC-DC Rectifiers (2)
Week 5	Power Converters and AC-DC Rectifiers (3)
Week 6	DC-DC Converters (1)
Week 7	DC-DC Converters (2)
Week 8	Inverters (1)
Week 9	Inverters (2)
Week 10	Inverters (3)
Week 11	AC-AC Converters: Cycloconverters, Voltage and frequency control.
Week 12	Motor drives and control
Week 13	Speed control of three-phase Permanent Magnet synchronous motor.

Week 14	Continue
Week 15	**Preparatory Week**
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction MATLAB (power electronics)
Week 2	Lab 2: AC-DC Rectifiers
Week 3	Lab 3: AC-DC Rectifiers
Week 4	Lab 4: DC-DC Converters
Week 5	Lab 5: Inverters
Week 6	Lab 6: AC-AC Converters
Week 7	Lab 7: Motor drives and control

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Power Electronics and Drives by Mohammed T. Lazim	Yes (Soft copy)
Recommended Texts	"Power Electronics: Circuits, Devices, and Applications" by Muhammad H. Rashid.	No
Websites	"Power Electronics: Converters, Applications, and Design" by Ned Mohan, Tore M. Undeland, and William P. Robbins.	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
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	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	ENGINEERING RESEARCH			**Module Delivery**	
Module Type	CORE			**lab** **Practical**	
Module Code	EEE4132				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	4		**Semester of Delivery**	8	
Administering Department	EEE		**College**	Engineering	
Module Leader	Dr. Ahmed K. Abed		**e-mail**	ahmed.abed@utq.edu.iq	
Module Leader's Acad. Title	Asst. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	None	
Review Committee Approval	01/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	EEE4130	**Semester**	7
Co-requisites module	None	**Semester**	None
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	This course is structured to assist senior students in understanding research processes and practices and, subsequently, to prepare students for executing independent research and writing. As part of the process, students will: 1- Selecting the problem statement. 2- working on literature survey. 3- Students will explore on the context within which their topic is important through the development of a literature review that establishes precedents for each part of their project. 4- Students will suggest a method or technique to tickle the problem. 5- Working with supervisor to collect data and build up the skeleton of the graduate project. 6- Designing, building, and running the project to analyze and conclude the results. 7- Writing and submitting a final project to committee which is appointed by the scientific committee in the department.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1-Understandig how can select a research topic that is related to the Electrical and electronics problems. 2-Identifying problem statement. 3-Reading a literature review about the problem statement. 4-Putting a technique or method to tickle the scientific problem. 5-Alayzing output data by using figures and tables. 6- Writing a final graduate project by depending on EEE4130 class.		
Indicative Contents المحتويات الإرشادية	This course is designed to facilitate the development and writing of the graduate Research. In conversation and consultation with peers and the instructor, students will: 1- Choosing the problem statement: The senior students together with their supervisor will select a problem in electrical and electronics engineering. 2- Literature survey: The students will collect, read, and understand the important article and materials that are required to suggest and implement the graduate project. 3- State-of-art methods: The senior students will identify the important State-of-art methods which are used to tickle the problem. 4- The proposal methods: The senior students will propose and implement a method or technique to develop State-of-art methods **OR** implement one of the State-of-art		

	methods. 5- Experimental works: The senior students will prepare all equipment and environment to apply the proposed method. 6- Implementing the proposed method. The senior student will implement, simulate, or emulate the proposed method under supervisor's instructions. 7- Analyzing the output data: The output data will be presented by figures and tables and write an appropriate conclusion in the final project. 8- Writing and submitting final graduate project: By depending on class EEE4130, the senior student will write and submit the final project and PowerPoint presentation file for final exam.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation by putting a solution to the scientific problem in electrical and electronics engineering. Also, the senior students will participate to implement this solution in the real time if that possible to show an enhancement and an improvement in the output data. Finally, the graduate students will able to read, analyze, propose, and write scientific article.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**		10% (0)		
	Assignments	3	20% (20)	4, 12	1,5,6
	Projects / Lab.	2	20% (20)	Continuous	2,4
	Report	1	10% (10)	7	
Summative assessment	**Midterm Exam**		10% (0)		
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1,2	
Week 3,4	
Week 5,6	
Week 7,8	
Week 9,10	
Week 11,12	
Week 13,14	
Week 15,16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2	Choosing the problem statement
Week 3,4	Literature survey
Week 5,6	State-of-art methods
Week 7,8	The proposal methods
Week 9,10	Experimental works
Week 11,12	Experimental works

Week13,14	Analyze the results and presenting it in appropriate ways.
Week15,16	Writing and submitting final graduate project.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Deb, D., Dey, R., & Balas, V. E. (2019). Engineering research methodology. A Practical Insight for Researchers, 153.	Yes
Recommended Texts	Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.	yes
Websites		

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

NB Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي

	Ministry of Higher Education and Scientific Research - Iraq University of Thi-Qar College of Engineering Department of Electrical and Electronics Engineering	

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Projects Management			**Module Delivery**	
Module Type	Core			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEE 4240				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level	4		**Semester of Delivery**	8	
Administering Department	EEE		**College**	ENG	
Module Leader	Hussein Nasser Wazeer		**e-mail**	Hussein-n@utq.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**		
Scientific Committee Approval Date	01/07/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Learn an Introduction to Project Management. 2. Learn Project Identification, Planning, Formulation and Appraisal. 3. Identify Project Organization and Implementation. 4. Learn Project Monitoring, Controls and Information Systems. 5. Learn Project Evaluation and Auditing. 6. Be familiar with Group Project Work, Reporting and Presentation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. To understand concepts of project management. 2. To develop a project plan. 3. To understand the project implementation strategy. 4. To analyze post project affects.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **PART (A):** Introduction to Project Management (5 Hours) Project definition; project objective(s); Definition of project management; Evolution of project management; Scope of project management, Elements of project management: organization, time, cost, quality, human resource, communication, risk, and integration Concept of project cycle: identification, formulation, appraisal, implementation and M&E, The Change as a result of project and impact of change in project management (Dynamic management, assumptions and risks). **PART (B):** Project Identification, Planning, Formulation and Appraisal (5 hours) Project identification studies (opportunity analysis) and marketing, Feasibility study (detailed project design, cost estimate, economic and financial analysis), Project appraisal: Technical, Commercial, Economic, Financial, Managerial, Social, Cost-Benefit, Project Risk, Environmental Impacts. **PART (C):** Project Organization and Implementation (5 Hours) Project organization Resource allocation: budgeting, material management (inventory), human resource allocation, and resource loading and leveling. Resource mobilization Project scheduling: scheduling techniques (Gantt, PERT, CPM, etc.) Project delays and impact: time and cost overrun

	Project administration **PART (D):** Project Monitoring, Controls and Information Systems (5 Hours) Purpose of monitoring and types of monitoring, Monitoring planning, controlling cycle Design of control systems, Project information system: Needs and reporting. **PART (E):** Project Evaluation and Auditing (5 Hours) Purpose of evaluation, Project auditing systems, Benefits monitoring and auditing techniques, Impact assessment, Project life cycle auditing **PART (F):** Group Project Work, Reporting and Presentation (5 Hours) Student will be divided into a convenient number of groups and each group will perform case study pertaining to project management assigned by respective teacher using relevant project management software.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In class lectures, online lectures

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO # 2, 3, and 4
	Assignments	2	10% (10)	2, 12	LO # 2 and 3
	Projects / Lab.	1	20% (20)	13	
	Report				
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-4
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Project Management
Week 2	Elements of project management
Week 3	Concept of project cycle
Week 4	Project identification studies
Week 5	Feasibility study (detailed project design, cost estimate, economic and financial analysis)
Week 6	Project appraisal
Week 7	Project organization
Week 8	Resource mobilization
Week 9	Project scheduling
Week 10	Project delays and impact
Week 11	Project administration
Week 12	Purpose of monitoring and types of monitoring
Week 13	Project information system
Week 14	Purpose of evaluation
Week 15	Preparatory week before the final Exam
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	leland, David I., "Project Management: Strategic Design and Implementation", (Third Edition); McGraw-Hill International Editions, General Engineering Series 1999	No
Recommended Texts	Meredith, Jack R. and Mantel, Samuel J. Jr., "Project Management: A Managerial Approaches"; John Wiley & Sons (1998)	No
Websites		

Grading Scheme مخطط الدرجات				
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