نموذج وصف البرنامج الأكاديمي

اسم الجامعة جامعة الموصل
الكلية المعهد: كلية الهندسة
القسم العلمي: الهندسة الكهربائية
اسم البرنامج الأكاديمي او المهني بكالوريوس الهندسة الكهربائية / الكترونيك واتصالات
اسم الشهادة النهائية بكالوريوس علوم في الهندسة الكهربائية / الكترونيك واتصالات.
النظام الدراسي: كورسات + مسار بولونيا
تاريخ اعداد الوصف: / /2026
تاريخ ملء الملف: / /2026

التوقيع:
اسم رئيس القسم: أ.د. عمر شرف الدين يحيى
التاريخ:

التوقيع:
اسم المعاون العلمي : أ. م. د. ايمن طالب حميد
التاريخ :

دقق الملف من قبل
شعبة ضمان الجودة والأداء الجامعي
اسم مدير شعبة ضمان الجودة والأداء الجامعي: أ.م. رنا رضوان عبد الرحمن
التاريخ
التوقيع

مصادقة السيد العميد
أ.د. عمر محمد حمدون

وزارة التعليم العالي والبحث العلمي
جهاز الإشراف والتقويم العلمي
دائرة ضمان الجودة والاعتماد الأكاديمي
قسم الاعتماد

دليل وصف البرنامج الأكاديمي

2026-2025

المقدمة:

يُعد البرنامج التعليمي بمثابة حزمة منسقة ومنظمة من المقررات الدراسية التي تشتمل على إجراءات وخبرات تنظم بشكل مفردات دراسية الغرض الأساس منها بناء وصقل مهـارات الخـريجين ممـا يجعلهم مـؤهلين لتلبيـة متطلبـات سـوق العمـل يتم مراجعته وتقييمه سنوياً عبر إجراءات وبرامج التدقيق الداخلي أو الخارجي مثل برنامج الممتحن الخارجي.

يقدم وصف البرنامج الأكاديمي ملخص موجز للسمات الرئيسة للبرنامج ومقرراته مبيناً المهارات التي يتم العمل على اكسابها للطلبة مبنية على وفق اهداف البرنـامج الأكاديمي وتتجلى أهمية هذا الوصف لكونه يمثل الحجر الأسـاس في الحصـول على الاعتماد البرامجي ويشترك في كتابته الملاكات التدريسية بإشراف اللجان العلمية في الأقسام العلمية.

ويتضمن هذا الدليل بنسخته الثانية وصفاً للبرنامج الأكاديمي بعد تحديث مفردات وفقرات الدليل السابق في ضوء مستجدات وتطورات النظـام التعليمي في العـراق والذي تضمن وصف البرنامج الأكاديمي بشكلها التقليدي نظام (سنوي، فصلي) فضلاً عن اعتماد وصف البرنامج الأكـاديمي المعمم بمـوجب كتـاب دائـرة الدراسـات ت م 3/2906 في 3/5/2023 فيما يخص البرامج التي تعتمد مسار بولونيا أساساً لعملها.

وفي هذا المجال لا يسعنا إلا أن نؤكد على أهمية كتابـة وصـف الـبرامج الاكاديميـة والمقررات الدراسية لضمان حسن سير العملية التعليمية.

مفاهيم ومصطلحات:

وصف البرنامج الأكاديمي:

يوفر وصف البرنامج الأكاديمي ايجـازاً مقتضـباً لرؤيتـه ورسـالته وأهدافـه متضـمناً وصـفاً دقيقـاً لمخرجات التعلم المستهدفة على وفق استراتيجيات تعلم محددة.

وصف المقرر: يوفر إيجازاً مقتضياً لأهم خصائص المقرر ومخرجات التعلم المتوقعة من الطـالب تحقيقها مبرهناً عما إذا كان قد حقق الاستفادة القصوى من فرص التعلم المتاحة. ويكون مشتق من وصف البرنامج.
رؤية البرنامج: صورة طموحة لمستقبل البرنامج الأكاديمي ليكون برنامجاً متطوراً وملهماً ومحفزاً وواقعياً وقابلاً للتطبيق.
رسالة البرنامج: توضح الأهداف والأنشطة اللازمة لتحقيقها بشكل موجز كما يحدد مسارات تطور البرنامج واتجاهاته.
اهداف البرنامج: هي عبارات تصف ما ينوي البرنامج الأكاديمي تحقيقه خلال فترة زمنيـة محـددة وتكون قابلة للقياس والملاحظة.
هيكلية المنهج: كافة المقررات الدراسية / المواد الدراسية التي يتضمنها البرنامج الأكاديمي على وفق نظام التعلم المعتمد (فصلي، سنوي، مسار بولونيا) سواء كانت متطلب (وزارة، جامعة، كلية وقسم علمي) مع عدد الوحدات الدراسية.
مخرجات التعلم: مجموعة متوافقة من المعارف والمهارات والقيم التي اكتسبها الطالب بعد انتهاء البرنامج الأكاديمي بنجاح ويجب أن يُحدد مخرجات التعلم لكل مقرر بالشكل الذي يحقق اهـداف البرنامج.
استراتيجيات التعليم والتعلم: بأنها الاستراتيجيات المستخدمة من قبل عضو هيئة التدريس لتطوير تعليم وتعلم الطالب وهي خطط يتم إتباعها للوصول إلى أهداف التعلم. أي تصف جميع الأنشطة الصفية واللاصفية لتحقيق نتائج التعلم للبرنامج.

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة الموصل
الكلية/ المعهد: كلية الهندسة
القسم العلمي: قسم الهندسة الكهربائية
اسم البرنامج الأكاديمي او المهني: بكالوريوس في علوم الهندسة الكهربائية / الكترونيك واتصالات
اسم الشهادة النهائية: بكالوريوس في علوم الهندسة الكهربائية / الكترونيك واتصالات

النظام الدراسي: بولونيا وفصلي
تاريخ اعداد الوصف: ----------
تاريخ ملء الملف: ----------

التوقيع : **التوقيع** :
اسم رئيس القسم: **اسم المعاون العلمي**:
التاريخ : **التاريخ** :

دقـق الملف من قبل
شعبة ضمان الجودة والأداء الجامعي
اسم مدير شعبة ضمان الجودة والأداء الجامعي:
التاريخ
التوقيع

م

صادقة السيد العميد

1. رؤية البرنامج
أن يكون قسما متميزا في التعليم والبحث العلمي وخدمة المجتمع في مجالات الهندسة الكهربائية.

2. رسالة البرنامج
توفير برامج تعليمية تتميز بالعمق في مجالات التخصص مع الشمول في الأسس الهندسية. ونشر المعرفة الهندسية والمساهمة في تطويرها في مجال الاختصاص. بالإضافة الى خدمة المشاريع الصناعية والمختصين في عموم قطاعات المجتمع.

3. اهداف البرنامج
1. إعداد كوادر هندسية كفؤة في اختصاص هندسة الإلكترونيـك والاتصـالات وكـذلك إعداد كوادر هندسية متخصصة من حملـة الشـهادات الاوليـة ولنفس التخصصـات أعلاه لكي تساهم في النهضة التنموية والعمرانية الشاملة في القطر. 2. المسـاهمة في تقـديم الخـدمات والاستشـارات الاكاديميـة والعلميـة والعمليـة والتطبيقية لكافة قطاعات الدولـة العـام والمختلـط والخـاص من خلال اتفاقيـات

التعاون وكذلك من خلال المكتب الاستشاري لكلية الهندسة.

3. إعـداد البحـوث الـتي تعمـل وتسـاهم على حـل المشـاكل والمعوقـات الهندسـية والصناعية التي تواجه المنشآت والمشاريع الصناعية في القطر.
4. المسامة في نشر وتطوير المعرفة الهندسية ونقل آخر المستجدات في مجـالات الهندسة الكهربائية والالكترونية إلى المهندسين في حقـول العمـل المختلفـة من خلال إقامة دورات التعليم المسـتمر والـدورات التدريبيـة وكـذلك من خلال نشـر البحوث العلمية في المجلات العلمية المتخصصة المحلية والعالمية.
5. تطوير الكوادر التدريسية عن طريق إيفاد قسم من التدريسيين في إفادات علمية للمشاركة في المـؤتمرات والنـدوات او ورش العمـل المشـتركة مـع مؤسسـات العربية والعالمية او الدوليـة وكـذلك عن طريـق منح اجـازات التفـرغ للعمـل في الجامعات خارج القطر مما يساعد في تبادل وتنمية الخبرات.

6. المشاركة في تنظيم وإقامة المؤتمرات والندوات وورش العمل والحلقات النقاشية العلمية داخل وخارج القطر.

4. الاعتماد البرامجي
البرنامج في طور المراجعة من قبل مجلس الوطني لاعتماد لتعليم الهندسي (ICAEE)

5. المؤثرات الخارجية الأخرى
لا يوجد

6. هيكلية البرنامج				
هيكل البرنامج	عدد المقررات	وحدة دراسية	النسبة المئوية	* ملاحظات
متطلبات المؤسسة	8	16	**7.2 %**	
متطلبات الكلية	**6**	**36**	**16.3 %**	
متطلبات القسم	46	**168**	**76.5 %**	
التدريب الصيفي	1	لا يوجد		
أخرى				

* ممكن ان تتضمن الملاحظات فيما اذا كان المقرر أساسي او اختياري .

1. وصف البرنامج

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الاول للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الأول

Semester 1 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EE101	Basics of Electrical Engineering I	اسس الهندسة الكهربائية ا	93	107	8.00	C	----
EE102	Mathematics I	الرياضيات ا	63	87	6.00	B	----
EE103	Engineering drawing	الرسم الهندسي	63	37	4.00	S	----
EE104	Physics I	الفيزياء ا	33	67	4.00	B	----
EE105	Mechanics Engineering	الهندسة الميكانيكية	33	42	3.00	S	----
UOM1031	Computer 1	الحاسوب 1	63	12	3.00	B	----
UOM1011	Arabic Language 1	اللغة العربية 1	33	17	2.00	B	----

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الاول للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الثاني

Semester 2 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EE108	Basics of Electrical Engineering II	اسس الهندسة الكهربائية II	93	107	8.00	C	----
EE109	Mathematics II	الرياضيات II	63	87	6.00	B	----
EE110	Computer Programming	برمجة الحاسوب	63	87	6.00	B	----
EE111	Digital Techniques	التقنيات الرقمية	48	27	3.00	C	----
EE112	Physics II	الفيزياء II	48	27	3.00	B	----
UOM1040	Democracy and Human Rights	الديمقراطية وحقوق الانسان	33	17	2.00	B	----
UOM1021	English Language 1	اللغة الانكليزية 1	33	17	2.00	B	----

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الثاني للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الأول

Semester 3 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EEEC201	Electrical Circuits Analysis I	تحليل الدوائر الكهربائية I	93	32	5.00	C	----
EEEC202	Mathematics III	الرياضيات III	78	47	5.00	B	----
EEEC203	Electronics Principles	مبادئ الالكترونيات	63	37	4.00	C	----
EEEC204	Communication Principles	مبادئ الاتصالات	63	62	5.00	C	----
EEEC205	Electromagnetic Fields	المجالات الكهرومغناطيسية	48	52	4.00	B	----
EEEC206	Electrical Engineering Lab. I	مختبرات الهندسة الكهربائية I	33	42	3.00	C	----
UOM2050	The crimes of the Baath regime in Iraq	جرائم نظام البعث في العراق	33	17	2.00	B	----
UOM2012	Arabic Language 2	اللغة العربية 2	33	17	2.00	B	----

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الثاني للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الثاني

Semester 4 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EEEC208	Electrical Circuits Analysis II	تحليل الدوائر الكهربائية II	93	32	5.00	C	----
EEEC209	Mathematics IV	الرياضيات IV	78	47	5.00	B	----
EEEC210	Electronic Circuits	دوائر الكترونية	63	37	4.00	C	----
EEEC211	Analog Communication	الاتصالات التناظرية	63	62	5.00	C	----
EEEC212	Electrical measurements	قياسات كهربائية	48	27	3.00	B	----
EEEC213	Electrical Engineering Lab. II	مختبرات الهندسة الكهربائية II	33	42	3.00	C	----
UOM2022	English language 2	اللغة الانكليزية 2	33	17	2.00	B	----
UOM2032	Computer 2	الحاسوب 2	63	12	3.00	B	----

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الثالث للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الأول

Semester 5 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EEEC301	Mathematical Analysis	التحليلات الرياضية	63	37	4.00	B	----
EEEC302	Electronics I	الكترونيات I	63	87	6.00	C	----
EEEC303	Microprocessors	معالجات دقيقة	63	87	6.00	C	----
EEEC304	Digital Communication	الاتصالات الرقمية	63	87	6.00	C	----
EEEC305	Digital Electronics	الكترونيك رقمي	63	37	4.00	C	----
EEEC306	Electronics and Communications Lab. I	مختبرات الالكترونيك والاتصالات I	63	37	4.00	C	----

مسار بولونيا / كلية الهندسة / جامعة الموصل / المستوى الثالث للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / الفصل الثاني

Semester 6 | 30 ECTS | 1 ECTS = 25 hrs

Code	Module	اسم المادة باللغة العربية	SSWL	USSWL	ECTS	Type	Pre-request
EEEC307	Numerical Analysis	التحليلات العددية	63	37	4.00	B	----
EEEC308	Electronics II	الكترونيك II	63	62	5.00	C	----
EEEC309	Antennas and Wave Propagation	الهوائيات وانتشار الموجات	63	62	5.00	C	----
EEEC310	Control Systems	نظم السيطرة	63	87	6.00	C	----
EEEC311	Programmable controllers	متحكمات مبرمجة	33	17	2.00	C	----
EEEC312	Electronics and Communications Lab. II	مختبرات الالكترونيك والاتصالات II	63	37	4.00	C	----
EEEC313	Engineering Project Design & Planning	تصميم وتخطيط المشروع الهندسي	33	17	2.00	C	
EEEC314	English language 3	اللغة الانكليزية 3	33	17	2.00	S	----

ملاحظة : الطالب مطالب باكمال التدريب الصيفي بعد نهاية الفصل الثاني للمستوى الثالث

النظام الفصلي / كلية الهندسة / جامعة الموصل / المستوى الرابع للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / قدرة ومكائن/ الفصل الاول

Code	Module	اسم المادة باللغة العربية	Theoretical	Practical	Applied	Units
EEC 406	Computer interfacing systems	**نظم الوصل البيني**	2		1	2
EEC 403	Mobile Communications	**الاتصالات المتنقلة**	2		1	3
EEC 405	Microelectronics I	**الالكترونيات الدقيقة I**	2		1	3
EEC 401	Computer Networks I	**شبكات الحاسوب I**	2		1	2
EEC 407	Electronics & Communications Lab. III	**مختبر الالكترونيك والاتصالات III**		4		2

EEC 404	Digital Signal Processing I	**معالجة الاشارة الرقمية I**	2		1	2
EEC 402	Control systems I	**نظم السيطرة I**	2		2	3

النظام الفصلي / كلية الهندسة / جامعة الموصل / المستوى الرابع للعام الدراسي 2025-2026 / قسم الهندسة الكهربائية / قدرة ومكائن/ الفصل الثاني

Code	**Module**	**اسم المادة باللغة العربية**	Theoretical	Practical	Applied	Units
EEC 418	Graduation Project	مشروع التخرج	2		2	4
EEC 415	Microelectronics II	الإلكترونيات الدقيقة II	2		1	3
EEC 411	Computer Networks II	شبكات الحاسوب II	2		1	2
EEC 417	Electronics & Communications Lab. IV	مختبر الالكترونيك والاتصالات IV		4		2
EEC 414	Digital Signal Processing II	معالجة الاشارة الرقمية II	2		1	2
EEC 412	Control systems II	نظم السيطرة II	2		2	3
EEC 420	Physics III	الفيزياء III	2		1	3
EEC 421	Chemistry	الكيمياء	2		1	3
EEC 413	Satellite Communications	اتصالات الاقمار الصناعية	2		2	3

7.	**مخرجات التعلم المتوقعة للبرنامج وفق متطلبات مجلس الاعتماد البرامجي العراقي الهندسي هي سبع مخرجات:**
	1. **القدرة على تحديد وصياغة وحل المشكلات الهندسية** في مجال هندسة الإلكترونيك والاتصالات من خلال تطبيق مبادئ الهندسة والعلوم والرياضيات. 2. **القدرة على تطبيق عملية التصميم الهندسي** لإنتاج حلول تلبي الاحتياجات المحددة مع مراعاة الصحة والسلامة العامة، والعوامل العالمية والثقافية والاجتماعية والبيئية والاقتصادية وغيرها من العوامل بما يتناسب مع التخصص. 3. **القدرة على تطوير وإجراء التجارب المناسبة، وتحليل البيانات وتفسيرها،** واستخدام الحكم الهندسي لاستخلاص النتائج. 4. **القدرة على التواصل بشكل فعال مع مجموعة واسعة من الجماهير.** 5. **القدرة على التعرف على المسؤوليات الأخلاقية والمهنية في المواقف الهندسية، وإصدار أحكام مستنيرة،** والتي يجب أن تأخذ في الاعتبار تأثير الحلول الهندسية في السياقات العالمية والاقتصادية والبيئية والمجتمعية. 6. **القدرة على إدراك الحاجة المستمرة لاكتساب معرفة جديدة، واختيار استراتيجيات التعلم المناسبة، وتطبيق هذه المعرفة.** 7. **القدرة على العمل بفعالية كعضو أو قائد لفريق يحدد الأهداف، ويخطط للمهام، ويفي بالمواعيد النهائية،** ويخلق بيئة تعاونية وشاملة.
الأهداف المعرفية	
	مخرج التعلم الاول (GO1) :القدرة على تحديد وصياغة وحل المشكلات الهندسية في مجال هندسة القدرة والمكائن من خلال تطبيق مبادئ الهندسة والعلوم والرياضيات. **مخرج التعلم الثاني (GO2) :القدرة على تطبيق عملية التصميم الهندسي** لإنتاج حلول تلبي الاحتياجات المحددة مع مراعاة الصحة والسلامة العامة، والعوامل العالمية والثقافية والاجتماعية والبيئية والاقتصادية وغيرها من العوامل بما يتناسب مع التخصص. **مخرج التعلم الثالث (GO3) :القدرة على تطوير وإجراء التجارب المناسبة، وتحليل البيانات وتفسيرها،** واســتخدام الحكم الهندسي لاستخلاص النتائج. **مخرج التعلم السادس (GO6) :القدرة على إدراك الحاجة المستمرة لاكتساب معرفة جديدة، واختيار استراتيجيات التعلم المناسبة، وتطبيق هذه المعرفة**
المهارات	
	مخرج التعلم الرابع (GO4) : قدرة **القدرة على التواصل بشكل فعال مع مجموعة واسعة من الجماهير.** **مخرج التعلم السابع (GO7) : القدرة على العمل بفعالية كعضو أو قائد لفريق يحدد الأهداف، ويخطط للمهام، ويفي بالمواعيد النهائية،** ويخلق بيئة تعاونية وشاملة.

القيم
مخرج التعلم الخامس (GO5) : القدرة على التعرف على المسؤوليات الأخلاقية والمهنية في المواقف الهندسية، وإصدار أحكام مستنيرة، والتي يجب أن تأخذ في الاعتبار تأثير الحلول الهندسية في السياقات العالمية والاقتصادية والبيئية والمجتمعية.

9. استراتيجيات التعليم والتعلم

-شرح المادة العلمية للطلاب بشكل تفصيلي.
2- مشاركة الطلاب في حل المسائل الرياضية
3- مناقشة وحوار حول مفردات متعلقة بالموضوع

10. طرائق التقييم

الامتحانات الأسبوعية والشهرية واليومية وامتحان نهاية السنة.

11. الهيئة التدريسية

أعضاء هيئة التدريس						
الرتبة العلمية	التخصص		المتطلبات/المهارات الخاصة (ان وجدت)		اعداد الهيئة التدريسية	
	عام	الدقيق			ملاك	محاضر
أستاذ	إلكترونيات واتصالات	هندسة الحالة الصلبة			1	
أستاذ	قدرة ومكائن	قدرة ومكائن			2	
أستاذ	قدرة ومكائن	إلكترونيات القدرة			1	
أستاذ مساعد	قدرة ومكائن	سيطرة آلية			1	
أستاذ مساعد	إلكترونيات واتصالات	هندسة الاتصالات			2	
أستاذ مساعد	قدرة ومكائن	إلكترونيات القدرة			3	
أستاذ مساعد	قدرة ومكائن	هندسة القدرة			2	
أستاذ مساعد	قدرة ومكائن	قدرة ومكائن			1	
أستاذ مساعد	إلكترونيات واتصالات	تكنولوجيا النانو			1	
مدرس	إلكترونيات واتصالات	هندسة الاتصالات			3	
مدرس	قدرة ومكائن	هندسة القدرة			9	
مدرس	قدرة ومكائن				1	
مدرس	إلكترونيات واتصالات				5	

مدرس	إلكترونيات واتصالات				1	
مدرس مساعد	إلكترونيات واتصالات				2	
مدرس مساعد	هندسة القدرة والمكائن				5	
مدرس مساعد	محطات ومنظومات القدرة الكهربائية				1	
مدرس مساعد	إلكترونيات واتصالات				1	

التطوير المهني

توجيه أعضاء هيئة التدريس الجدد

البرنامج الأكاديمي لقسم الهندسة الكهرباء مصمم لتعزيز المعرفة والمهارات الشاملة لأعضاء هيئة التدريس الجدد في مجالات تعليمية متنوعة. يبدأ البرنامج بالتركيز على تزويد أعضاء هيئة التدريس بالقدرة الأساسية على إدارة مهامهم بفعالية. ثم يتقدم ليشمل العمليات والإجراءات الضرورية لضمان تحقيق نتائج التعليم المستهدفة بنجاح في برامج متنوعة.

لتحقيق هذه الأهداف، يتضمن البرنامج المكونات الرئيسية التالية:

- دورات تعليمية: يشارك أعضاء هيئة التدريس الجدد في دورات تعليمية تهدف إلى تحسين جودة عملية التعليم. تغطي هذه الدورات مجموعة من المواضيع، بما في ذلك: تدريب على أساليب التدريس: تعليم استراتيجيات فعالة لجذب انتباه الطلاب وتقديم محتوى الدورة.
- الاتجاهات الحديثة في تدريس الجامعات: استكشاف النهج الابتكاري في التعليم والتعلم في التعليم العالي.
- تقييم الطلاب: دورات وورش علمية للأعضاء الجدد حول عملية تقييم أداء الطلاب وفهمهم.
- إعداد الاختبارات: استراتيجيات لإعداد اختبارات عادلة.
- سياسات الجامعة: تعرف على القوانين واللوائح والتعليمات ومنصات التعليم الإلكتروني ذات الصلة.
- التقييم المستمر: يخضع أعضاء هيئة التدريس، سواء كانوا بدوام كامل أو جزئي، لتقييم مستمر لتحديد المجالات التي يحتاجون إلى تطويرها طوال حياتهم الوظيفية التعليمية. يساعد هذا العملية في ضمان أن أعضاء هيئة التدريس يعملون بشكل مستمر على التحسين والتكيف لتلبية احتياجات الطلاب والجامعة المتطورة.
- فرص التطوير المهني: يتم تشجيع أعضاء هيئة التدريس على المشاركة في دورات تطوير هيئة التدريس التي تقدمها القسم أو وحدة التعليم المستمر في الجامعة. توفر هذه الدورات فرصًا لأعضاء هيئة التدريس لتحسين مهاراتهم والبقاء على اطلاع بالاتجاهات في التعليم والتعلم، والتعاون مع الزملاء.

التطوير المهني لأعضاء هيئة التدريس

لدى هيئة التدريس في قسم الهندسة الكهربائية روابط مع الوزارات رئيسية في العراق: وزارة التعليم العالي والبحث العلمي، ووزارة الكهرباء والاتصالات والبلديات الصحة وغيرها . وقد نظمت في القسم العديد من الندوات خلال الأعوام الماضية بإشراف وزارة التعليم العالي والبحث العلمي. وكانت موضوعات الندوات هي التحديات في معالجة مشاكل نقص الطاقة الموصل والعراق. وتزود هذه الروابط أعضاء هيئة التدريس بالخبرات العملية.

وفي هذا السياق فقد نظمت لجنة التعليم المستمر بقسم هندسة السدود والموارد المائية محاضرات وورش عمل لأعضاء هيئة التدريس في مختلف المجالات خلال السنوات الأكاديمية الثلاثة الماضية وكما يلي:

- ✓ تطوير أساليب التعليم والتعلم الإلكتروني/9
- ✓ المنشورات العلمية/ 44
- ✓ الاعتماد الأكاديمي/ 2
- ✓ ندوات متنوعة في مجال هندسة السدود والموارد المائية/ 1
- ✓ المشاركة في المؤتمرات والندوات وورش العمل والدورات التدريبية خارج العراق/ 4
- ✓ المشاركة في المؤتمرات والندوات وورش العمل والدورات التدريبية داخل العراق/ 37

معيار القبول **12.**

يتم تحديد الطاقة الاستيعابية لقسم الهندسة الكهربائية ضمن خطة القبول وحسب طاقة القسم في القبول، حيث تحدد اللجنة العلمية العدد المطلوب استيعابه من الطلبة الجدد ثم ترسل الى العمادة ومن ثم الجامعة ومن ثم الوزارة للحصول على الموافقات الرسمية. ليكون مؤهلاً للالتحاق بقسم الهندسة الكهربائية على مستوى الدراسة الجامعية، يجب على المتقدمين تلبية بعض الشروط. يشرف على عملية القبول وزارة التعليم العالي والبحث العلمي، التي تدير وتخصص تلقائياً قبول الطلاب للمؤسسات الحكومية والكليات بناءً على درجاتهم في المدرسة الثانوية. وفيما يلي بعض الشروط الرئيسية لقبول الطلاب:

أ- الجنسية العراقية وسنة الميلاد: يجب على المتقدمين أن يكونوا من حملة الجنسية العراقية.

ب- شهادة الثانوية العراقية: يحتاج المتقدمون إلى امتلاك شهادة صادرة عن مدرسة ثانوية عراقية معتمدة من وزارة التربية.

ج- الشهادة الطبية: يجب على المتقدمين تقديم شهادة طبية للتأكد من أنهم يستوفون الشروط الصحية اللازمة.

د- الالتحاق بدوام كامل: يجب على المتقدمين الالتزام بأن يكونوا طلاباً بدوام كامل، مكرسين وقتهم وجهودهم لدراستهم في القسم.

ه- عدم قبول الاستمرار في الدراسة في كلية أخرى. ف- الطلاب غير العراقيين (القادمين) الذين حصلوا على شهادة من مدرسة ثانوية عراقية يتم قبولهم وفقًا للقبول المركزي.

ج- قبول 10% من أفضل خريجي المعاهد التقنية.

ح- قبول الطلاب الموهوبين.

13. أهم مصادر المعلومات عن البرنامج

1. دليل الجامعة

2. الموقع الإلكتروني للكلية: https://uomosul.edu.iq/engineering

14. خطة تطوير البرنامج

لتعزيز جودة التعليم، ورفع نتائج الخريجين، وتلبية الكفاءات المطلوبة ، قرر مجلس القسم اعتماد "نظام بولونيا للتعليم". بدلاً من النظام المعتمد ، وذلك تماشيًا (ECTS) يتضمن هذا النظام نظام الانتقال والتراكم الأوروبي للوحدات الدراسية مع التزام القسم بالتحسين المستمر. سيتم تنفيذ النظام الجديد اعتبارًا من العام الأكاديمي 2025-2026. من المتوقع أن يحقق اعتماد عملية بولونيا عدة فوائد:

- التعلم الموجه باتجاه الطالب: يضع النظام الطلاب في صلب عملية التعلم، مما يعزز النظام التعليمي بشكل عام .
- زيادة التفاعل الصفي: يعزز التفاعل المستمر بين التدريسين والطلاب بيئة تعليمية أكثر ديناميكية.
- التركيز على المهارات المهنية والعملية: يوضع التركيز على اكتساب المهارات العملية ذات الصلة بالتطوير المهني .
- فرصة للتعلم المستمر: سيكون للطلاب فرصة للتعلم والتقييم والملاحظات المستمرة.
- تقييم الأداء نصف السنوي: يتيح النظام تقييم أداء الطلاب مرتين في السنة، مما يوفر ملاحظات أكثر شمولاً.

تعميق فهم المواضيع: من المتوقع أن يساهم النظام في تعميق فهم الطلاب للمواضيع.

ملخص مهارات البرنامج/ المستوى الأول

مخرجات التعلم المطلوبة من البرنامج

Year/Level	Course Code	Course Name	اسم المادة باللغة العربي	Basic or optional	المعرفة			المهارات		القيم	
					GO1	GO2	GO3	GO6	GO4	GO7	GO5
1	EE101	Basics of Electrical Engineering I	اسس الهندسة الكهربائية ا	Core	✔						
	EE102	Mathematics I	الرياضيات ا	Basic	✔						
	EE103	Engineering drawing	الرسم الهندسي	Support	✔						
	EE104	Physics I	الفيزياء ا	Basic	✔						
	EE105	Mechanics Engineering	الهندسة الميكانيكية	Support	✔						
	UOM1031	Computer 1	الحاسوب 1	Basic	✔			✔			
	UOM1011	Arabic Language 1	اللغة العربية 1	Basic	✔						
	EE108	Basics of Electrical Engineering II	اسس الهندسة الكهربائية II	Core	✔						
	EE109	Mathematics II	الرياضيات II	Basic	✔						
	EE110	Computer programming	برمجة الحاسوب	Basic	✔			✔			
	EE111	Digital Techniques	التقنيات الرقمية	Core	✔						
	EE112	Physics II	الفيزياء II	Basic	✔						
	UOM1040	Democracy and human rights	الديمقراطية وحقوق الانسان	Basic	✔						
	UOM1021	English language 1	اللغة الانكليزية 1	Basic	✔				✔		

ملخص مهارات البرنامج/ المستوى الثاني

مخرجات التعلم المطلوبة من البرنامج										
القيم	المهارات		المعرفة				Basic or optional	اسم المادة باللغة العربي	Course Name	Course Code	Year/ Level
GO5	GO7	GO4	GO6	GO3	GO2	GO1					
						✔	Core	تحليل الدوائر الكهربائية I	Electrical Circuits Analysis I	EEEC201	2
						✔	Basic	الرياضيات III	Mathematics III	EEEC202	
						✔	Core	مبادئ الالكترونيات	Electronics Principles	EEEC203	
						✔	Core	مبادئ الاتصالات	Communication Principles	EEEC204	
						✔	Basic	المجالات الكهرومغناطيسية	Electromagnetic Fields	EEEC205	
	✔			✔		✔	Core	مختبرات الهندسة الكهربائية I	Electrical Engineering Lab. I	EEEC206	
						✔	Basic	جرائم نظام البعث في العراق	The crimes of the Baath regime in Iraq	UOM2050	
						✔	Basic	اللغة العربية 2	Arabic Language 2	UOM2012	
						✔	Core	تحليل الدوائر الكهربائية II	Electrical Circuits Analysis II	EEEC208	
						✔	Basic	الرياضيات IV	Mathematics IV	EEEC209	
						✔	Core	دوائر الكترونية	Electronic Circuits	EEEC210	
						✔	Core	الاتصالات التناظرية	Analog Communication	EEEC211	
						✔	Basic	قياسات كهربائية	Electrical measurements	EEEC212	
	✔			✔		✔	Core	مختبرات الهندسة الكهربائية II	Electrical Engineering Lab. II	EEEC213	
		✔				✔	Basic	اللغة الانكليزية 2	English language 2	UOM2022	
			✔			✔	Basic	الحاسوب 2	Computer 2	UOM2032	

ملخص مهارات البرنامج/ المستوى الثالث

مخرجات التعلم المطلوبة من البرنامج											
القيم	المهارات		المعرفة				Basic or optional	اسم المادة باللغة العربي	Course Name	Course Code	Year/Level
GO5	GO7	GO4	GO6	GO3	GO2	GO1					
						✔	Basic	التحليلات الرياضية	Mathematical Analysis	EEEC301	3
						✔	Core	الكترونيات I	Electronics I	EEEC302	
						✔	Core	معالجات دقيقة	Microprocessors	EEEC303	
						✔	Core	الاتصالات الرقمية	Digital Communication	EEEC304	
						✔	Core	الكترونيك رقمي	Digital Electronics	EEEC305	
	✔			✔		✔	Core	مختبرات الالكترونيك والاتصالات I	Electronics and Communications Lab. I	EEEC306	
						✔	Basic	التحليلات العددية	Numerical Analysis	EEEC307	
						✔	Core	الكترونيك II	Electronics II	EEEC308	
						✔	Core	الهوائيات وانتشار الموجات	Antennas and Wave Propagation	EEEC309	
						✔	Core	نظم السيطرة	Control Systems	EEEC310	
						✔	Core	متحكمات مبرمجة	Programmable controllers	EEEC311	
	✔			✔		✔	Core	مختبرات الالكترونيك والاتصالات II	Electronics and Communications Lab. II	EEEC312	
						✔	Core	تصميم وتخطيط المشروع الهندسي	Engineering Project Design & Planning	EEEC313	
		✔				✔	Support	اللغة الانكليزية 3	English language 3	EEEC314	

ملخص مهارات البرنامج/ المستوى الرابع

مخرجات التعلم المطلوبة من البرنامج

Year/Level	Course Code	Course Name	اسم المادة باللغة العربي	Basic or optional	المعرفة				المهارات		القيم
					GO1	GO2	GO3	GO6	GO4	GO7	GO5
4	EEC 406	Computer interfacing systems	نظم الوصل البيني	Core	✔						
	EEC 403	Mobile Communications	الاتصالات المتنقلة	Core	✔						
	EEC 405	Microelectronics I	الالكترونيات الدقيقة I	Core	✔						
	EEC 401	Computer Networks I	شبكات الحاسوب I	Core	✔						
	EEC 407	Electronics & Communications Lab. III	مختبر الالكترونيك والاتصالات III	Core	✔		✔			✔	
	EEC 404	Digital Signal Processing I	معالجة الاشارة الرقمية I	Core	✔						
	EEC 402	Control systems I	نظم السيطرة I	Core	✔	✔					
	EEC 418	Graduation Project	مشروع التخرج	Support	✔				✔	✔	
	EEC 415	Microelectronics II	الإلكترونيات الدقيقة II	Core	✔						
	EEC 411	Computer Networks II	شبكات الحاسوب II	Core	✔						
	EEC 417	Electronics & Communications Lab. IV	مختبر الالكترونيك والاتصالات IV	Core	✔		✔			✔	
	EEC 414	Digital Signal Processing II	معالجة الاشارة الرقمية II	Core	✔						
	EEC 412	Control systems II	نظم السيطرة II	Core	✔	✔					
	EEC 420	Physics III	الفيزياء III	Basic	✔						
	EEC 421	Chemistry	الكيمياء	Basic	✔						
	EEC 413	Satellite Communications	اتصالات الاقمار الصناعية	Core	✔	✔					

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Basics of Electrical Engineering I** اسس الهندسة الكهربائية ا			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE101**				
ECTS Credits	**8**				
SWL (hr./sem)	**200**				
Module Level	UGI	UGI	**Semester of Delivery**	1	
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		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	1. To develop problem solving skills and understanding of DC circuit theory through the application of techniques. 2. To understand voltage, current and power from a given DC circuit. 3. This course deals with the basic concept of DC electrical circuits. 4. This is the basic subject for all DC electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis. 7. To perform Thevenin and superposition theory.
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. Describe electrical voltage, current and power. 5. Define Ohm's law. 6. Identify the basic circuit passive and active elements and their applications. 7. Discuss the various properties of resistors. 8. Explain the two Kirchhoff's laws used in circuit analysis. 9. Explain the Analysis Methods used in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Circuit Components and values** DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Circuit reduction** combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.]

	Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

As

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Lab.	2	30% (12)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week

	Material Covered
Week 1	Basic Concept & Units: Electricity & atomic structure of substance, current and current density, current flow, electric circuit, E.M. F& potential difference
Week 2	international system of unit, abbreviation for multiples & sub-multiples, quantities derived from SI units, units of force-energy-torque and power, relation between energy and heat, electric units, efficiency & percentage efficiency, electromechanical equivalent of element
Week 3	Ohm's law, resistivity & conductivity
Week 4	temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	equivalent resistance: Series-parallel-circulating current method-floating source method & grouping of E.M.F. sources, double subscript
Week 6	power calculation in D.C circuit
Week 7	Kirchhoff's laws: KVL-KCL
Week 8	Mid-term Exam
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current

	sources and their transformation
Week 10	Maxwell’s circulating currents (mesh analysis)
Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin’s theorem and Norton’s theorem
Week 14	maximum power transfer theorem
Week 15	millman theorem, substitution theorem and reciprocity theorem
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (analog and digital)
Week 3	Lab 3: Introduction to resistance measurements (practical and color code)
Week 4	Lab 4: resistance temperature affect, internal resistance of a source, open circuit & short circuit
Week 5	Lab 5: ohm’s Law
Week 6	Lab 6: series and parallel resistance
Week 7	Lab 7: resistance delta and star transformation
Week 8	Lab 8: Kirchhoff's Voltage Law
Week 9	Lab 9: Kirchhoff's Current Law
Week 10	Lab 10: implementation of Maxwell’s circulating currents (mesh analysis)
Week 11	Lab 11: implementation of Nodal analysis
Week 12	Lab 12: implementation of Superposition theorem
Week 13	Lab 13: implementation of Thevenin’s / Norton's Theorem

Week 14	Lab 14: implementation of maximum power transfer theorem
Week 15	Lab 15: DC power measurements (methods and instrumentations)

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Mathematics I** **الرياضيات I**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE102**		
ECTS Credits	**6**		
SWL (hr./sem)	**150**		

Module Level	UGI	**Semester of Delivery**	1
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	أ.م.د. عمر شرف الدين	**e-mail**	
Module Leader's Acad. Title	لقبه العلمي	**Module Leader's Qualification**	الشهادة
Module Tutor	Dr. Mohammed Abdulmalek Ahmed	**e-mail**	Ahmedm86@uomosul.edu.iq
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	29/03/2026	**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	8. Student be able to solve simultaneous liner equations and inequalities involving the square root and modulus function. 9. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 10. Student be able to recognize odd, even, periodic, increasing, decreasing functions. 11. understand the operation of composition of functions and the concept of functional inverse. 12. recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 13. be able to calculate limits by substitution and by eliminating zero denominators. 14. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 15. know the basic rules of differentiation and use them to find derivatives of products and quotients. 16. know the chain rule and use it to find derivatives of composite functions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course students will be expected to 10. be able to solve algebraic equations and inequalities involving the square root and modulus function. 11. understand the difference between equations and identities, and be able to prove simple identities and inequalities. 12. know addition and double-angle formulas for trigonometric functions and use them to express values of trigonometric functions in the surds form. 13. be able to recognize odd, even, periodic, increasing, decreasing functions. 14. understand the operation of composition of functions and the concept of functional inverse. 15. to able to recognize linear, quadratic, power, polynomial, algebraic, rational, trigonometric, exponential, hyperbolic and logarithmic functions and sketch their graphs. 16. be able to calculate limits by substitution and by eliminating zero

	denominators. 17. be able to calculate limits at infinity of rational functions. 18. know derivatives of power, trigonometric, exponential, hyperbolic, logarithmic and inverse trigonometric functions. 19. know the basic rules of differentiation and use them to find derivatives of products and quotients. 20. know the chain rule and use it to find derivatives of composite functions.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – Matrices</u>** Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Cramers Rule, Solve equations by Matrices: Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method. [8 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 hr.] **<u>Part B - Coordinates and Graphs in the Plane</u>** Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing, Slope and Equations for Lines: Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations, Functions and their Graphs, Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces, Shifts, Circles, and Parabolas: How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas, A Review of Trigonometric Functions: Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions, Limits and Continuity: Limits, Examples of Limits, The Sandwich Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.. [14 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **<u>Part C- Derivatives</u>** Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines, The Derivative of a function, The Slope of Lines, Differentiation Rules: Integer Powers, Multiples, Sums, and Differences, Second and Higher Order Derivatives, Negative Integer Powers of x, Velocity, Speed, and Other Rate of Change: Velocity, Speed, Acceleration, Derivatives of Trigonometric Functions: The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions, The Chain Rule: Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule, Implicit Differentiation and Fractional Powers: Lenses,

	Tangents, and Normal Lines, Using Implicit Differentiation to Find Derivatives of Higher Order, Fractional Powers of Differentiable Functions, Linear Approximations and Differentials. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

As

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	1	5% (5)	7	LO #2, 3, 4, 5 and 6
	Homework	3	12% (12)	4,8,10	LO #2-3, 4-7 and 8-9
	Report	1	8% (8)	8	
Summative assessment	Midterm Exam	1.5 hr	10% (10)	7	LO # 1-9
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	**Matrices:** Basic Definitions, Addition, Subtraction and Multiplication, Determinants, The Inverse of a 3 x 3 Matrix, Creamers Rule.
Week 2	**Solve equations by Matrices:** Gaussian Elimination. the method of finding the inverse of a square matrix, solution of simultaneous linear equations by matrix method.
Week 3	**Coordinates and Graphs in the Plane:** Directions and Quadrants, Distance between Points, Graphs of Equations, Intercepts and More about Graphing.
Week 4	**Slope and Equations for Lines:** Slope of Non-vertical Lines, Lines that are Parallel or Perpendicular, Point – Slope Equations, Slope – Intercept Equations.
Week 5	**Functions and their Graphs:** Domains and Ranges are Often Intervals, Even Functions and Odd Functions, Functions Defined in Pieces.
Week 6	**Shifts, Circles, and Parabolas:** How to Shift a Graph, Equations for Circles in the Plane, Equations for Parabolas.
Week 7	**A Review of Trigonometric Functions:** Radian Measure, The Six Basic Trigonometric Functions, Calculating Sines and Cosines, Graphs of Trigonometric Functions.
Week 8	**Limits and Continuity:** Limits, Examples of Limits, The Sandwich

	Theorem and $(\sin\theta)/\theta$, Limits Involving Infinity, Continuous Functions.
Week 9	**Derivatives:** Slopes, Tangent Lines, and Derivatives, Defining Slopes and Tangent Lines The Derivative of a function, The Slope of Lines.
Week 10	**Differentiation Rules:** Integer Powers, Multiples, Sums, and Differences Second and Higher Order Derivatives, Negative Integer Powers of x.
Week 11	**Velocity, Speed, and Other Rate of Change:** Velocity, Speed, Acceleration
Week 12	**Derivatives of Trigonometric Functions:** The Derivative of the Sine, The Derivative of the Cosine, The Derivative of the Other Basic Functions.
Week 13	**The Chain Rule:** Integer Powers of Differentiable Functions, Derivative Formulas that Include the Chain Rule.
Week 14	**Implicit Differentiation:** Lenses, Tangents, and Normal Lines Using Implicit Differentiation to Find Derivatives of Higher Order.
Week 15	**Fractional Powers:** Fractional Powers of Differentiable Functions, Linear Approximations and Differentials.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://www.khanacademy.org)	

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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Engineering Drawing** **الرسم الهندسي**	**Module Delivery**	
Module Type	**Support**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE103**		
ECTS Credits	**4**		
SWL (hr./sem)	**100**		

Module Level	UGI	**Semester of Delivery**	1
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	اسم رئيس القسم	**e-mail**	البريد الالكتروني لرئيس القسم
Module Leader's Acad. Title	لقبه العلمي	**Module Leader's Qualification**	الشهادة
Module Tutor	Sura Mohammad Adil Alhayali	**e-mail**	sura_alhayali@uomosul.edu.iq
Peer Reviewer Name	اسم مُراجع الملف	**e-mail**	بريده الالكتروني
Scientific Committee Approval Date	24/03/2026	**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	17. To develop the engineer's ability to imagine projections and their models. 18. Engineering drawing exercises hand movement to complete quick sketches. 19. This course deals with theory of Orthographic Projection. 20. This is the basic subject for isometric drawing. 21. To teach students engineering drawings using AutoCAD program, and this includes both theoretical lectures and Lab. 22. To help students to use AutoCAD for engineering drawings efficiently in their designs & projects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	21. Absorbing all the engineering characteristics of an object or a product in a clear manner. 22. Know the tools used in engineering drawing and how to use them correctly 23. understand and apply the basics of engineering processes. 24. Conclude projections and isometric for each geometric figure and recognize its dimensions. 25. students will be able to use AutoCAD commands to make drawings 26. create & insert symbols, dimension in a drawing, create blocks, and plot drawings with certain scales.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A – tools, lines, scale, Engineering processes (part 1) & getting started, view commands</u>** Introduction to engineering drawing, learn about engineering tools and how to use them. Types of pens, Billboard layout and address field preparation, Types of lines [3 hrs.] Classwork 1. [2 hrs.] Defining the drawing scale and its types, apply and draw engineering processes [3 hrs.] Classwork 2. [2 hrs.] Lab: Getting started, view Commands [10 hrs.] Quizzes [1 hr.] **<u>Part B- Engineering processes (part 2) , Orthographic Projection (part 1) &Drawing , modify I Commands</u>** Draw tangents, Types of projections resulting from vertical projection. [6 hrs.] Classwork 3. [2 hrs.] , Classwork 4. [2 hrs.]

	Lab: Drawing Commands, modify I Commands [10 hrs.] Quizzes [1 hr.] **Part C- Orthographic Projection (part 2) , Isometric Drawing & Modify II, Dimensions , text Commands** Arrangement and drawing of projections, draw the isometrically axis, Imagine and draw the isometrically body [8 hrs.] Classwork 5. [2 hrs.] , Classwork 6. [2 hrs.] Lab: Modify II Commands, Dimension Commands, Text Commands [8 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

As

تقييم المادة الدراسية						
		Time/Number	**(Marks)**	**Weight**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	2×4=8	8%		LO #1, 5, 8 and 9
	Assignments (H.W)	4	4×2=8	8%		LO #1, 2, 4, 6 7, 8 and 9
	Assignments (C.W)	2	2×2=4	4%		
	Lab.	4	4×5=20	20%		All
	Report	0	0	0%		----
Summative assessment	**Midterm Exam**	2 hr	10	10%		LO # 1-5
	Final Exam	3hr	50	50%		All
Total assessment			100% (100 Marks)			

Week

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction and definition of engineering drawing, learn about engineering tools, Types of pens used, Drawing board layout
Week 2	Types of lines in engineering drawing, Defining the drawing scale and its types
Week 3	Classwork 1
Week 4	Engineering processes (part 1): Teaching students how to apply and draw line relationships
Week 5	Classwork 2
Week 6	Engineering processes (part 2): Making tangents, reverse curves
Week 7	Classwork 3
Week 8	Mid-term Exam
Week 9	Orthographic Projection (part 1): theory of Orthographic Projection, combination of views

Week 10	Classwork 4
Week 11	Orthographic Projection (part 1): Arrangement and drawing of projections
Week 12	Classwork 5
Week 13	Isometric Drawing, I: draw the isometrically axis, Imagine and draw the isometrically body
Week 14	Classwork 6
Week 15	Isometric Drawing II: isometric circles
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: start a new drawing, user Interface, units, limits
Week 2	Lab 2: grid, snap, absolute & relative coordinate system, ortho.
Week 3	Lab 3: zoom, pan, osnap, polar tracking
Week 4	Lab 4: pline, pedit, selecting object, erase
Week 5	Lab 5: ltype, ltscale.
Week 6	Lab 6: line, arc, circle, ellipse
Week 7	Lab 7: polygon, rectangle
Week 8	Lab 8: copy, move, mirror, trim, rotate
Week 9	Lab 9: scale, undo, redo, stretch, divide
Week 10	Lab 10: extend, offset.
Week 11	Lab 11: array, Lweight , Measure
Week 12	Lab 12: Fillet , Chamfer, Explode
Week 13	Lab 13: Text, Mtext, Area

Week 14	Lab 14: Dimensions & Leaders, color
Week 15	Lab 15: Block, plot.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Drawing and Graphic Technology , By French & Vierk , Steven Durbin , Twelve Edition	No
	كتاب الرسم الهندسي المساعد تأليف : أ.م. ثامر محمد نوري & م. سرى عبد الرزاق مجيد , 2021	
Recommended Texts	كتاب الرسم الهندسي تأليف : الأستاذ عبد الرسول الخفاف , 1986	No
	الرسم المعماري والهندسي بمساعدة الحاسوب تأليف : د. عماد هاني العلاف , 2018	No
	اساسيات الرسم الهندسي تأليف : احمد نظام محمد الحيالي , 2022	No
Websites	دروس تعليم اوتوكاد 2014 : https://www.dailymotion.com/video/x31bg6x	

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	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.

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Physics I** **الفيزياء I**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE104**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	UGx11	1	**Semester of Delivery**		1
Administering Department		(Electrical Engineering)	**College**	(Engineering)	
Module Leader	Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Prof	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Ahmad Abduljabbar Ismael		**e-mail**	a.a.ismail@uomosul.edu.iq	
Peer Reviewer Name		Mr. Omar Turath	**e-mail**	omartawfeeq_1981@uomosul.edu.iq	
Scientific Committee Approval Date		29/11/2025	**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	23. To understand many principles and units and their abbreviations correctly in the physics, such as State SI units, determine whether a physical quantity is a vector or a scalar, and distinguish between kinematic and kinetic energy.

	24. To understand Differentiate between static and kinetic friction, and solve friction problems; State and apply Hooke's law for ideal springs; Define work, and calculate the work done by a constant force in one and two dimensions. 25. This course deals with Define, calculate, and distinguish between distance and displacement, average and instantaneous speed and velocity, and average and instantaneous acceleration; State, explain, and apply Newton's three laws of motion. 26. This course deals with the basic concept of the State the work–energy theorem, and use it to solve problems; Apply the principle of conservation of mechanical energy to solve simple problems in mechanics; Calculate both kinetic and potential energy; Calculate the power. 27. To develop problem, solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations (i.e., Earth, Moon, Sun and etc.); Derive the equation of continuity for fluids. 28. To perform and analysis of heat transfer through the facades of the buildings; Define and describe the flow of heat through a material by direct molecular contact (conduction); Derive the equation of heat transfer by conduction. 29. To understand energy level and atomic structure through energy-band theory of materials; Internal structure of materials of materials including metals, insulators and semiconductors; Electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission. 30. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 31. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	27. Determine whether a physical quantity is a vector or a scalar; State, explain, and apply Newton's three laws of motion; State and apply Hooke's law for ideal springs; State the work–energy theorem, and use it to solve problems; Express Newton's laws in terms of rates of change of linear momentum; Calculate the pressure and density of fluid at different depth. 28. Define and describe the Bohr model of an atom; Define electron, proton, neutron, and nucleus; Explain electron shells and orbits; Explain insulators, conductors, and semiconductors and how they differ; Define valence band and conduction band Compare a semiconductor atom to a conductor atom. 29. Understanding of the fundamental concepts of current and voltage; Explain the of electrical circuit element and its objects; Define Ohm's Law; Define Power and Energy; Calculate Power and Energy. 30. Describe Analysis the Electric Circuits in Parallel and Series connection; Define

	Kirchhoff's law; Analysis the Electric Circuits using Kirchhoff's law; Solve problems using Kirchhoff's law; Explain the electrical symbol for a diode; Define bias and its effect on the depletion region; Define barrier potential and its effects; Several Diode Applications. 31. Discuss the various properties of diodes and transistors. 32. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors. 33. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Introduction to physics** Physics quantities, Length, mass and time; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion. Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power. Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion. [**8 hrs**.] Revision problem and tutorial classes [**2 hrs**.] Quizzes [**1 hr**.] **Part B- Atoms:** Atoms Structure; Atomic Energy Level; and Materials Used in Electronics. Current and Voltage; electrical circuit; and Ohm's Law. Power and Energy; and Parallel and Series Networks. Kirchhoff's Law. [**8 hrs**.] Quizzes [**1 hr**.] **Part C- Diode Circuit Applications:** p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of

	Operation and type, Transistor biasing circuits, Application Circuit. [**8 hrs.**] Revision problem and tutorial classes [**4 hrs.**] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي 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	67	**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

As

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to physics; Standards of length, mass and time; Scalar and Vector quantities; Kinematics; Position, Displacement and Distance; Speed, Velocity and Acceleration; Forces and motion; Mass and gravity force; Newton's three laws of motion.
Week 2	Spring forces and Hooke's law; Friction forces; Uniform circular motion; Work; Kinetic and Potential Energy; The work-kinetic energy theorem; Conservation of total mechanical energy; and Power.
Week 3	Linear momentum; Momentum and kinetic energy; Rate of change of linear momentum and Newton's laws; Law of conservation of linear momentum; Impulse; and Simple Harmonic Motion.
Week 4	Universal gravitation; Newton's law of universal gravitation; Free-fall acceleration and the gravitational force; and Solve problems using Newton's law of universal gravitation and calculate the gravitation for different locations.
Week 5	Fluid mechanics; Pressure and density of fluid at different depth; Hydrostatic pressure; Pascal's principle and the operation of a hydraulic lift; Buoyant forces and Archimedes's principle; the equation of continuity for fluids; and the Bernoulli's equation.
Week 6	Basic of Architectural Physics; and Solar Radiation.
Week 7	Basic of Architectural Physics; and Solar Radiation.
Week 8	Sound; Noise; Sound Intensity
Week 9	Sound Insulation; and Thermal Behavior of Materials

Week 10	Atoms Structure; Atomic Energy Level; and Materials Used in Electronics.
Week 11	Current and Voltage; electrical circuit; and Ohm's Law.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh Edition.	

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	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Mechanics Engineering** **الهندسة الميكانيكية**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE105**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	UGx11	UGI	**Semester of Delivery**	1	
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Mohammed Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**	Doctor	
Module Tutor	Dr.ammar younis Ibrahim		**e-mail**	drammar2020@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		08/06/2023	**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	32. The module aims of Mechanical and Thermodynamics typically include providing students with a comprehensive understanding of the principles and applications of mechanical engineering and thermodynamics. The specific aims may vary depending on the educational institution or course, but here are

	some common objectives: 33. Understanding Fundamental Concepts: The module aims to introduce students to the fundamental concepts and principles of mechanical engineering and thermodynamics. This includes topics such as mechanics, kinematics, dynamics, energy, heat transfer, and thermodynamic processes. 34. Analytical and Problem-Solving Skills: The module aims to develop students' analytical and problem-solving skills related to mechanical and thermodynamic systems. This involves teaching them how to apply mathematical and scientific principles to solve engineering problems, analyze mechanical systems, and evaluate thermodynamic processes. 35. Thermodynamic Systems: The module aims to familiarize students with the behavior of thermodynamic systems and their applications. This includes studying topics such as the laws of thermodynamics, properties of pure substances, gas laws, energy conversion processes, power cycles, and refrigeration cycles. 36. Heat Transfer: The module aims to teach students about the principles of heat transfer and its applications in engineering. This involves studying modes of heat transfer, including conduction, convection, and radiation, as well as heat exchangers, thermal insulation, and heat transfer analysis in various systems. 37. Mechanical Systems and Dynamics: The module aims to provide students with an understanding of mechanical systems and their dynamics. This includes topics such as statics, dynamics, forces, motion, and mechanical components like gears, bearings, and linkages.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Mechanical Engineering: 34. Apply fundamental principles of mechanics to analyze and solve engineering problems. 35. analyze mechanical components and systems considering factors such as strength, stiffness, and safety. 36. knowledge of thermodynamics and fluid mechanics to analyze energy conversion systems. Thermodynamics: 37. Understand the basic concepts and laws of thermodynamics, including energy, entropy, and the First and Second Laws of Thermodynamics. 38. Apply thermodynamic principles to analyze and solve problems related to heat transfer, work, and energy conversion. 39. Analyze thermal systems, including power cycles, refrigeration cycles, and heat exchangers.

	40. Apply thermodynamic principles to analyze combustion processes and internal combustion engines. 41. Apply thermodynamic principles to analyze renewable energy systems, such as solar and wind power systems. 42. Understand the impact of thermodynamics on environmental sustainability and energy efficiency.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A** Static: Force system, Units system, Forces + Components, Resultant, Moment and Couples, Equilibrium, Centroid, Moment of Inertia, Friction. Revision problem and tutorial classes. [**15 hr.**] Revision problem and tutorial classes **[5 hrs.]** Quizzes [**1 hr**.] **Part B** Dynamics: Rectilinear motion, Curvilinear motion, Projectile, Circular motion, Acceleration Components (Rectangular Comp., Normal Tangential Comp.), Kinetic -2nd Law of Newton. **[15 hrs.]** Revision problem and tutorial classes **[5 hrs.]** Quizzes [**1 hr**.] **Part C** Thermodynamics: Properties of Substance, Pressure and Temperature, Work and Energy, Ideal Gas, First Law of Thermodynamics, 2nd Law of Thermodynamics. Hook's law. [**15 hr**.] Revision problem and tutorial classes [**5 hrs**.] Revision problem and tutorial classes **[6 hrs.]** Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

As

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5,10	LO #1, 4, 6 and 7
	Assignments	5	5% (5)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0% (0)	----	-----
	Report	2	25% (25)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	8	LO # 4-8
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**

Week 1	Static: Force system
Week 2	Units system, Forces and Components
Week 3	Resultant, Moment and Couples
Week 4	Equilibrium and Centroid
Week 5	Moment of Inertia and Friction
Week 6	Dynamics: Rectilinear motion
Week 7	Curvilinear motion, Projectile and Circular motion
Week 8	Midterm Exam
Week 9	Acceleration Components (Rectangular Comp., Normal Tangential Comp.)
Week 10	Kinetic - 2nd Law of Newton
Week 11	Thermodynamics: Properties of Substance and Pressure and Temperature
Week 12	Work and Energy and Ideal Gas
Week 13	First Law of Thermodynamics
Week 14	2nd Law of Thermodynamics
Week 15	Hook's law
Week 16	**Preparatory week before the final Exam**

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	Computer 1 الحاسوب 1	Module Delivery
Module Type	Basic	☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	UOM1031	
ECTS Credits	3	
SWL (hr./sem)	75	

Module Level	First Level	Semester of Delivery	One
Administering Department	Department of Electrical Engineering	College	Engineering
Module Leader	Dr. Omar Sh. Alyozbaky	e-mail	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Head of Department	Module Leader's Qualification	PhD
Module Tutor	Aws Thamir Mayouf	e-mail	awsthamir@uomosul.edu.iq
Peer Reviewer Name		e-mail	
Scientific Committee Approval Date		Version Number	1.1

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 module aims to prepare students to work with computers. It also teaches students the fundamentals of computers and their components. Students will learn about computer operating systems, with a focus on Windows. Students will also learn how to use Microsoft Office applications: Word, Excel, and PowerPoint.
Module Learning	1. The ability to identify, analyze, and solve complex engineering

Outcomes مخرجات التعلم للمادة الدراسية	problems based on the principles of engineering, science, and mathematics. 2. The ability to acquire and apply new knowledge using appropriate learning strategies. 3. The ability to participate in and work professionally and ethically on multidisciplinary teams and projects. Students who pass this module are expected to learn the following topics: 1. Computers and operating systems 2. Software and hardware interaction 3. Windows File Management 4. Operating System Customization 5. Computer Hardware 6. Monthly Lab Exam 7. Exploring Microsoft Office 8. Getting Started with MS Word Essentials 9. Editing and Formatting Documents 10. Getting Started with MS Excel Essentials 11. Organizing and Enhancing Worksheets 12. Creating Formulas and Charting Data 13. Getting Started with MS PowerPoint Essentials 11. Organizing and Enhancing Slides 12. Creating Presentations
Indicative Contents المحتويات الإرشادية	Computers and Operating System [6 hr] Software and Hardware Interaction [6 hr] Windows File Management [3 hr] Operating System Customization [3 hr] Computer Hardware [3 hr] Exploring Microsoft Office [1.5 hr]

	Getting Started with MS Word Essentials [1.5 hr] Editing and Formatting Documents [3 hr] Getting Started with MS Excel Essentials [3 hr] Organizing and Enhancing Worksheets [3 hr] Creating Formulas and Charting Data [3 hr] Getting Started with MS PowerPoint Essentials [3 hr] Organizing and Enhancing Slides [1.5 hr] Creating Presentations [1.5 hr]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for teaching this module is to encourage student participation in laboratory activities and refine and expand their critical thinking skills. This will be achieved through classes, laboratory work, and external research involving computer technology that interests students. 1. Lectures: • Structured lectures introduce fundamental concepts and practical applications. • Emphasis is placed on fundamental understanding, practical application, and actual use of the software. 2. Problem-solving sessions • Guided tutorials focus on solving real problems related to the software. • Students practice the fundamentals of the software. • Active student participation is encouraged through in-class discussions. 3. Project-Based Learning: • Individual or group mini-projects involve the practical use of the software. 4. Self-Directed Learning: • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support a deeper understanding. 5. Continuous Feedback: • Regular formative feedback is provided through assignments, quizzes, labs, and reports.

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا

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	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

As

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4, 11	LO#Q1: 1-2, Q2: 7-9
	Assignments	2	5% (5)	3, 10	LO#A1: 1-2, A2: 7-9
	Lab	10	20% (20)	CONTINUES	All
	Report	1	5% (5)	14	All
Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	9	LO # 1-5
	Final Exam	3 hrs.	50% (50)		
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week

	Material Covered
Week 1	Computers and Operating System

Week 2	Computers and Operating System (continue)
Week 3	Software and Hardware Interaction
Week 4	Software and Hardware Interaction (continue)
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7	Computer Hardware
Week 8	Exploring Microsoft Office and Getting Started with MS Word Essentials
Week 9	Mid-Term Exam
Week 10	Editing and Formatting Documents
Week 11	Getting Started with MS Excel Essentials
Week 12	Organizing and Enhancing Worksheets
Week 13	Creating Formulas and Charting Data
Week 14	Getting Started with MS PowerPoint Essentials
Week 15	Organizing and Enhancing Slides and Creating Presentations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Computers and Operating System
Week 2	Computers and Operating System (continue)
Week 3	Software and Hardware Interaction

Week 4	Software and Hardware Interaction (continue)
Week 5	Windows File Management
Week 6	Operating System Customization
Week 7	Computer Hardware
Week 8	Exploring Microsoft Office and Getting Started with MS Word Essentials
Week 9	Mid-Term Exam
Week 10	Editing and Formatting Documents
Week 11	Getting Started with MS Excel Essentials
Week 12	Organizing and Enhancing Worksheets
Week 13	Creating Formulas and Charting Data
Week 14	Getting Started with MS PowerPoint Essentials
Week 15	Organizing and Enhancing Slides and Creating Presentations

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	2015 Computer Literacy BASICS: A Comprehensive Guide to IC3 Connie Morrison, Dolores Wells, Lisa RuffoloCengage Learning. ISBN: 128576658X	Available as PDF
Recommended Texts	IC3 GS5 Certification Guide Using Windows 10 & Office 2016	
Websites	**Google Classroom**	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title اسم المنهج	**Arabic Language 1** **اللغة العربية 1**	**Module Delivery**
Module Type نوع المنهج	اساسي	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	UOM1011	

رمز المنهج				
ECTS Credits عدد الوحدات	2			☐ **Tutorial** ☐**Practical** ☒ **Seminar**
SWL (hr/sem) الحمل الكلي	50			
Module Level / المستوى UGx11	1	**Semester of Delivery /** سحب المنهج	1	
Administering Department القسم الإداري	ENV8	**College** الكلية	ENG4	
Module Leader اسم التدريسي		**e-mail** البريد الالكتروني		
Module Leader's Acad. Title		**Module Leader's Qualification**		
Module Tutor		**e-mail**		
Peer Reviewer Name	------	**e-mail**	E-mail	
Scientific Committee Approval Date	26/11/2023	**Version Number**	2.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	الهدف من هذا الفصل الدراسي هو تعريف الطلاب بالموضوعات الرئيسية لمادة اللغة العربية. سيغطي الفصل الدراسي المتطلبات الأساسية لتعاريف اللغة العربية، قواعد نحوية للأزمنة، تنمية القدرات النحوية لصيغ المفرد والجمع والممنوع من الجرد، بالإضافة الى البلاغة والتطبيق. وفي نهاية الفصل، سيكون لدى الطلاب معرفة واسعة بالمفاهيم وسيتم تحقيق ذلك من خلال المحاضرات النظرية والدروس والواجبات البتية والتقارير ذات الصلة بالمواضيع المطروقة.
Module Learning Outcomes	**CLO1:** تعريف الطالب بألفاظ اللّغة العربيّة الصحيحة وتراكيبها وأساليبها السليمة بطريقة

مخرجات التعلم للمادة الدراسية	مشوقة وجذابة. **CLO2:** أن يستغل الطالب وقت فراغه بالقراءة والاطلاع والرجوع إلى المكتبة. **CLO3:** تمكين الطالب من القراءة الصحيحة، وأن يكتسب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتّصال مع الآخرين. **CLO4:** تنمية الذوق الأدبي لدى الطالب حتى يدرك النواحي الجمالية في أساليب الكلام ومعانيه وصورة. **CLO5:** تنمية قدرة ومهارة الطالب الإملائية والخطية بحيث يستطيع الكتابة الصحيحة للكتب والمخاطبات الرسمية. **:CLO6** تمكين الطالب على كتابة التقارير العملية والنظرية والعروض التقديمية بلغة عربية واضحة وصحيحة. **:CLO7** القدرة على اكتساب وتطبيق المعرفة الجديدة واستخدام استراتيجيات تعليم مناسبة. **:CLO8** القدرة على المشاركة والعمل بمهنية واخلاقية للعمل في فرق متعددة التخصصات.
Indicative Contents المحتويات الإرشادية	**الجزء الأول:** مقدمة عن اللغة العربية (4 ساعات) • مقدمة عن اللغة العربية • تعريف اللغة العربية ومميزاتها **الجزء الثاني:** قواعد نحوية وتشمل: (6 ساعات) • الفعل الماضي • الفعل الماضي • الافعال الخمسة **الجزء الثالث:** تنمية القواعد النحوية وتشمل: (6 ساعات) • المثنى والجمع (المذكر السالم والمؤنث السالم) • التعجب • الممنوع من الصرف • المجرد والمزيد **الجزء الرابع:** البلاغة والتطبيق (8 ساعات) • الاستعارة • الجناس • الطباق • التشبيه

	الجزء الخامس: قواعد املائية: (3 ساعات) سوف يتم تعريف الطالب عن الأخطاء الاملائية الشائعة وطرق تجنبها بالإضافة الى كتابة المخاطبات الادرية. **الجزء السادس:** قواعد العد والمعدود: (3 ساعات) تعريف الطالب بقواعد واحكام العد والمعدود في اللغة العربية.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies الاستراتيجيات	توسيع مدارك الطلاب لمادة اللغة العربية، والإلمام بالمفاهيم الأساسية للغة العربية والبلاغة، والقدرة على التمييز بين الأزمنة. يحتوي هذه الفصل على العديد من المكونات التي تشمل دراسة المحاضرات والبرامج التعليمية والمناقشة والواجبات المنزلية ومنصات التعلم الإلكتروني. سيتم تدريس الدورة باللغة العربية، ويجب تقديم جميع المهام الإلزامية في غضون المواعيد النهائية للقبول في الامتحان.

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	2.2
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

As

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative Assessment التقويم	**Quizzes** الكويز	3	6% (18)	4, 9, and 13	All
	H.W Assignments	2	4% (8)	5, 11	CLO4, CLO5, and CLO6

	الواجبات البيتية				
	Seminars السمنار	1	6% (6)	12	All
	On-site Assignment واجبات داخل الصف	2	4% (8)	6, 10	CLO4, CLO5, and CLO6
Summative Assessment التقويم التلخيصي	**Midterm Exam** امتحان نصف الفصل	2 hrs	10% (10)	7	All
	Final Exam الامتحان النهائي	3 hrs	50% (50)	16	All
Total Assessment / التقويم النهائي			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	**Material Covered /** المواضيع المغطاة
Week 1	مقدمة عن اللغة العربية وتعريف اللغة العربية ومميزاتها
Week 2	قواعد نحوية: الفعل الماضي
Week 3	قواعد نحوية: الفعل المضارع
Week 4	قواعد نحوية: الأفعال الخمسة
Week 5	تنمية القواعد النحوية: المثنى والجمع (المذكر السالم والمؤنث السالم)
Week 6	تنمية القواعد النحوية: التعجب، الممنوع من الصرف والمجرد والمزيد
Week 7	الامتحان الفصلي
Week 8	البلاغة والتطبيق: الاستعارة
Week 9	البلاغة والتطبيق: الجناس
Week 10	البلاغة والتطبيق: الطباق
Week 11	البلاغة والتطبيق: التشبيه

Week 12	الأخطاء الاملائية
Week 13	المخاطبات الإدارية
Week 14	قواعد واحكام العد والمعدود
Week 15	قواعد واحكام العد والمعدود
Week 16	الامتحان النهائي

Delivery Plan (Weekly Lab. Syllabus)

Week	**Material Covered / المواضيع المغطاة**
Week 1	لا يوجد
Week 2	لا يوجد
Week 3	لا يوجد
Week 4	لا يوجد
Week 5	لا يوجد
Week 6	لا يوجد
Week 7	لا يوجد

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text الاسم	**Available in the Library?** هل متوفر في المكتبة؟
Required Texts المنهج المطلوب	جامع الدروس العربية / مصطفى الغلاييني	نعم
Recommended Texts المنهج الموصى به	النحو الوافي / عباس حسن	نعم
Websites المواقع الالكترونية	https://uomosul.edu.iq/en/engineering/environmental-engineering-dept/	

Grading Scheme

مخطط الدرجات

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

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نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Basics of Electrical Engineering II** اسس الهندسة الكهربائية II			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE108**				
ECTS Credits	**8**				
SWL (hr./sem)	**200**				
Module Level	UGx1	UGI	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Omar Muwafaq Mahmood		**e-mail**	omer_alyousif@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		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	38. To develop problem solving skills and understanding of AC circuit theory through the application of techniques. 39. To understand voltage, current and power from a given AC circuit. 40. This course deals with the basic concept of AC electrical circuits. 41. This is the basic subject for all AC electrical and electronic circuits. 42. To understand Kirchhoff's current and voltage Laws problems. 43. To perform mesh and Nodal analysis. 44. To perform Thevenin and superposition theory. 45. To understand the resonant circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	43. Recognize how electricity works in electrical circuits. 44. List the various terms associated with electrical circuits. 45. Summarize what is meant by a basic AC electric circuit. 46. Describe electrical AC voltage, current and power. 47. Define Ohm's law in AC circuits. 48. Identify the basic circuit passive and active elements and their applications. 49. Discuss the various properties of impedance. 50. Explain the two Kirchhoff's laws used in AC circuit analysis. 51. Explain the Analysis Methods used in AC Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Circuit Components and values</u>** AC circuits, Current and voltage definitions, circuit elements, impedance networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **<u>Part B- Circuit reduction</u>** combining sources, Combining impedances elements in series and parallel, delta and star transformation. [12 hrs.]

	Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] **Part C- Circuit Theory** Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to Thevenin and Norton theory, maximum power transfer, introduction to superposition theory, the resonant circuits. [24 hrs.] Revision problem and tutorial classes [16 hrs.] Lab. [16 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	123	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	8
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

As

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Week

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Basic Concept & Units in AC circuits, waveforms of AC sources
Week 2	Average and RMS values, Form Factor, Crest Factor
Week 3	Ohm's law, impedance and admittance calculations
Week 4	equivalent impedance: Series-parallel and delta – star transformation
Week 5	power calculation in A.C circuit and power factor
Week 6	Kirchhoff's laws: KVL-KCL
Week 7	Phasor diagram
Week 8	Mid-term Exam
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Maxwell's circulating currents (mesh analysis)

Week 11	nodal analysis
Week 12	superposition theorem
Week 13	Thevenin’s theorem and Norton’s theorem
Week 14	maximum power transfer theorem
Week 15	Resonant circuits
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Introduction to AVO meter (using in AC circuits) and oscilloscope
Week 3	Lab 3: Introduction to AC function generator
Week 4	Lab 4: ohm’s Law application in AC circuit
Week 5	Lab 5: series and parallel impedance, delta and star transformation
Week 6	Lab 6: Kirchhoff's Voltage Law
Week 7	Lab 7: Kirchhoff's Current Law
Week 8	Lab 8: implementation of Maxwell’s circulating currents (mesh analysis)
Week 9	Lab 9: implementation of Nodal analysis
Week 10	Lab 10: implementation of Superposition theorem
Week 11	Lab 11: implementation of Thevenin’s / Norton's Theorem
Week 12	Lab 12: implementation of maximum power transfer theorem
Week 13	Lab 13:AC power measurements (methods and instrumentations)
Week 14	Lab 14: power factor measurements
Week 15	Lab 15: resonance circuits validation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Engineering Circuit Analysis 7th Edition by William Hayt , Jack Kemmerly , Steven Durbin	Yes
Recommended Texts	Schaum's Outline of Basic Circuit Analysis, Second Edition (Schaum's Outlines) 2nd Edition, by John O'Malley	No
Websites	AC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2017.	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
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نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Mathematics II** **II الرياضيات**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE109**		
ECTS Credits	**6**		
SWL (hr./sem)	**150**		

Module Level	UGI	**Semester of Delivery**	2
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	أ.م.د. عمر شرف الدين	**e-mail**	البريد الالكتروني لرئيس القسم
Module Leader's Acad. Title	لقبه العلمي	**Module Leader's Qualification**	الشهادة
Module Tutor	Dr. Mohammed Abdulmalek Ahmed	**e-mail**	Ahmedm86@uomosul.edu.iq
Peer Reviewer Name	اسم مُراجع الملف	**e-mail**	بريده الالكتروني
Scientific Committee Approval Date	29/03/2026	**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	- Help students communicate mathematical ideas through the practice of proper mathematical otations. 1. Provide students with a strong support for basic learning calculus concepts: limits, derivatives, and integration. 2. Help students communicate mathematical ideas through the practice of proper mathematical notations. 3. Help students to verify mathematical ideas through the practice of proper mathematical proof techniques. 4. Developing mathematical thinking and understanding in students by guiding them towards deep thinking rather than “memorizing all the rules”. 5. Increase students’ awareness of alternate means of learning such as group study, as well as strategies that will enhance the learning of mathematics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, the student will be able to: 1. how to calculate the area under and between curves. 2. interpret a volume of revolution of a function’s graph around a given axis as a (Riemann) sum of disks or cylindrical shells, convert to definite integral form and compute its value. 3. express the length of a curve as a (Riemann) sum of linear segments, convert to definite integral form and compute its value.

	4. express the surface area of revolution of a function's graph around a given axis as a (Riemann) sum of rings, convert to definite integral form and compute its value. 5. antidifferentiate products of functions by parts. 6. recognize and implement appropriate techniques to anti-differentiate products o trigonometric functions. 7. devise and apply a trigonometric substitution in integrals involving Pythagorean Quotients. 8. decompose a rational integrand using partial fractions. 9. determine convergence of improper integrals with discontinuities in their domain or infinite limits of integration.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Definite Integrals** **Areas between Curves**: The Basic Formula, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry, **Volumes of Solids of Revolution:** Disc Method, Washer Method, Cylindrical Shells Method, **Lengths of Curves in the Plane:** The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula**, Area of Surfaces of Revolution:** The Basic Formula, Revolution about the y-axis, The Short Differential Form**.** [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [2 hr.] **Techniques of Integration:** **Basic Integration Formulas:** Algebraic Procedures and Trigonometric Identities, **Integration by Parts:** The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration, **Trigonometric Integrals:** Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions, **Trigonometric Substitution:** Trigonometric Substitution for Combining Squares, Integrals involving $ax2+bx+c$,$a\neq0$, Two Useful Formulas, **Rational Functions and Partial Fractions:** General Description of the Method, The Substitution $z=\tan(x2/)$. [24 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [2 hr.] **Plane Curves and Polar Coordinates**: Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary

	Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates, **Graphing in Polar Coordinates:** Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect. [6 hrs.] Revision problem and tutorial classes [2 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.		
Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**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**

As

Formative assessment	**Quizzes**	3	15% (15)	4,8,12	LO #2, 5, 8, 9 and 11
	Assignments	1	5% (5)	7	LO #2, 3, 4, 5 and 6
	Homework	3	12% (12)	4,8,10	LO #2-3, 4-7 and 8-9
	Report	1	8% (8)	8	
Summative assessment	**Midterm Exam**	1.5 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

Week	Material Covered
Week 1	**Calculus and Area:** Regions Bounded by Curves, Area under the Graph of a Nonnegative Continuous Function.
Week 2	**Definite Integrals:** Constant Functions, Area is Strictly a Special Case.
Week 3	**Indefinite Integrals:** The Indefinite Integral of a Function, Rules of Algebra, The Integrals of $sin2x$ and $cos2x$, Solving Initial Value Problems with Indefinite Integrals.
Week 4	**Integration by Substitution-Running the Chain Rule Backward:** The Generalized Power Rule in Integral Form, Sines and Cosines, The Substitution Method of Integration, Substitution in Definite Integrals.
Week 5	**Application of Definite Integrals: Areas between Curves**: The Basic Formula, Derived from Riemann Sums, Curves That Cross Boundaries with Changing Formulas, Integrating with Respect to y, Combining Integrals with Formulas from Geometry.
Week 6	**Volumes of Solids of Revolution:** Disc Method, Washer Method, Cylindrical Shells Method.
Week 7	**Lengths of Curves in the Plane:** The Basic Formula, Dealing with Discontinuities in dy/dx, The Short Differential Formula.
Week 8	**Area of Surfaces of Revolution:** The Basic Formula, Revolution about the y-axis, The Short Differential Form.
Week 9	**Techniques of Integration: Basic Integration Formulas**: Algebraic Procedures and Trigonometric Identities.
Week 10	**Integration by Parts:** The Formula, Repeated Use, Solving for the Unknown Integral, Tabular Integration.
Week 11	**Trigonometric Integrals:** Products of Sines and Cosines, Eliminating Square Roots, Integrals of Powers

	of tanx and secx, Integrals of Odd Functions, Definite Integrals of Even Functions.
Week 12	**Trigonometric Substitution:** Trigonometric Substitution for Combining Squares, Integrals involving $ax2+bx+$,≠0, Two Useful Formulas.
Week 13	**Rational Functions and Partial Fractions:** General Description of the Method, The Substitution z=tan($x2⁄$).
Week 14	**Plane Curves and Polar Coordinates:** Polar Coordinates, Definition of Polar Coordinates, Negative Values of r, Changing to Radian Measure, The Use of Radian Measure, Elementary Coordinate, Equations and Inequalities, Cartesian Versus Polar Coordinates.
Week 15	**Graphing in Polar Coordinates:** Symmetry and Slope, Faster Graphing, Finding the Points Where Curves Intersect.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus, Thirteenth Edition, by George B. Thomas,	Yes
Recommended Texts	Calculus, Mathematics for Engineers and Technologists, 2002, by Huw Fox and Bill Bolton.	No
Websites	Khan Academy math (https://www.khanacademy.org)	

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	**FX –** Fail	راسب (قيد)	(45-49)	More work required but credit awarded

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer Programming** برمجة الحاسوب			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE110**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		First Level	**Semester of Delivery**		Two
Administering Department		Department of Electrical Engineering	**College**	Engineering	
Module Leader	Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Department	**Module Leader's Qualification**		PhD
Module Tutor	Aws Thamir Mayouf		**e-mail**	awsthamir@uomosul.edu.iq	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		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	1. Introduction of MATLAB program (m file). 2. To understand Types of variables, numbers, Expressions, operation and function. 3. To understand Solving of Electrical circuit in MATLAB program. 4. To perform Solving equations by symbols. 5. To solve the Function and its application (pulse & ramp functions). 6. To perform Engineering graphics (two dimensions and three dimensions) such as vector diagram mesh, bar plots). 7. To perform Matrix and its applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Proficiency in MATLAB: Students should develop a strong understanding of the MATLAB programming language, syntax, and functionality. They should be able to write, debug, and modify M-file programs effectively. 2. Problem-solving skills: MATLAB is often used for scientific and engineering applications, so students should learn how to apply MATLAB to solve complex problems in their respective fields. They should be able to analyze problems, develop algorithms, and implement them using MATLAB. 3. Data analysis and visualization: MATLAB offers powerful tools for data analysis and visualization. Students should learn how to import, manipulate, analyze, and visualize data using MATLAB functions and techniques. 4. computation: MATLAB is well known for its mathematical computing capabilities. Students should become proficient in using MATLAB for performing mathematical computations, including linear algebra and differential equations.

	5. Algorithm development: MATLAB allows students to develop algorithms and implement them in M-file programs. They should learn how to break down complex problems into smaller, manageable tasks, design algorithms to solve those tasks, and integrate them into a complete MATLAB program. 6. Code optimization: Students should develop skills in optimizing MATLAB code for improved performance and efficiency. 7. Debugging and troubleshooting: MATLAB programs may encounter errors or produce unexpected results. Students should learn how to effectively debug and troubleshoot their M-file programs, identify and resolve issues, and improve the overall reliability of their code. 8. Documentation and code organization: Writing clear and well-organized code is crucial for collaboration and future maintenance. Students should learn to document their MATLAB programs, including comments, variable naming conventions, and overall code structure 9. Project implementation: In some cases, students may be required to develop larger-scale projects using MATLAB. They should learn how to plan, manage, and implement MATLAB-based projects, ensuring that their programs meet the specified requirements and deliver the desired outcomes.
Indicative Contents المحتويات الإرشادية	Part A - Circuit Components and values Introduction to MATLAB, Types of variables, Numbers and Expressions, Operation, Functions, Solving set of linear equations, Function and its application (pulse & ramp functions). [14 hrs.] Lab. [14 hrs.] Revision problem and tutorial classes [4 hrs.] Part B- Circuit reduction Differentiation, Integration, Solving of Electrical circuit, Engineering graphics (two dimension and three dimensions) such as vector diagram mesh and bar plots, Solving of ordinary differential equation, Curve fitting and interpolation, Matrix and its applications [14 hrs.] Lab. [14 hrs.]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy for delivering this module is to encourage student participation in exercises that refine and expand critical thinking skills. This will be achieved through classes and interactive tutorials, as well as by conducting simple experiments involving sampling activities that interest the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

As

Module Evaluation تقييم المادة الدراسية					
		Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	1	10% (10)	4, 8, 12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6, 7, 8 and 9
	Projects / Lab.	2	25% (25)	CONTINUES	All
	Report	0	0% (0)	---	---

Summative assessment	**Midterm Exam**	2 hrs.	10% (10)	8	LO # 1-5
	Final Exam	3 hrs.	50% (50)	16	All
Total assessment			100% (100)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Complex Numbers, Array Operations, Matrix Operations
Week 3	Application of matrix, Solving set of linear equations.
Week 4	Control structures in MATLAB program.
Week 5	Plotting commands 2-D Graphics.
Week 6	Polynomials analysis.
Week 7	Function Files, its application (pulse & ramp functions)
Week 8	Revision – Mid Term Exam
Week 9	Solving equations by symbols.
Week 10	Numerical Integration.
Week 11	Transient Analysis.
Week 12	Frequency Response using MATLAB
Week 13	Partial fraction Expansion.
Week 14	Application on Battery Charging on circuit.
Week 15	Engineering graphics 3D.

Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Introduction to MATLAB, Types of variables, numbers. Expressions
Week 2	Applied Complex Numbers, Array Operations, Matrix Operations.
Week 3	Applied Application of matrix, Solving set of linear equations.
Week 4	Applied Control structures in MATLAB program.
Week 5	Applied Plotting commands for 2-D Graphics.
Week 6	Applied Polynomials analysis.
Week 7	Applied Function Files, its application (pulse & ramp functions)
Week 8	Revision – Mid Term Exam
Week 9	Applied Solving equation by symbols.
Week 10	Applied Numerical Integration.
Week 11	Applied Transient Analysis.
Week 12	Applied Frequency Response using MATLAB
Week 13	Applied Partial Fraction Expansion.
Week 14	Applied Application on Battery Charging on circuit.
Week 15	Applied Engineering graphics 3D.

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Numerical Analysis Using MATLAB® and Excel® Third Edition, Steven T. Karris.	Available as PDF
Recommended Texts	• ELEMENTARY MATHEMATICAL and COMPUTATIONAL TOOLS for ELECTRICAL and COMPUTER ENGINEERS USING MATLAB, Jamal T. Manassah City College of New York,2011 • ELECTRONICS and CIRCUIT ANALYSIS using MATLAB, JOHN O. ATTIA ,1999	
Websites	**Google Classroom**	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Techniques التقنيات الرقمية**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE111**				
ECTS Credits	**3**				
SWL (hr./sem)	**100**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	اسم رئيس القسم		**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	Dr. Azam Esam Dawood		**e-mail**	azzam.esam@uomosul.edu.iq	
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date			**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	46. To develop problem solving skills and understanding of Digital circuit theory through the application of techniques. 47. To understand Digital circuit, latches and Flip-flops, asynchronous binary counters, synchronous binary counters. 48. This course deals with the basic concept of latches and Flip-flops, asynchronous binary counters, synchronous binary counters. 49. To construct data storage units/shift registers using flip flops 50. To analyze sequential logic circuits using appropriate tools. 51. To design and analyze synchronous binary, up/down counters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	52. Recognize how combinational logic circuits works. 53. Design combinational logic circuits using combination logic design process. 54. Define and describe various latches and Flip-flops 55. Construct data storage units/shift registers using flip flops 56. Define asynchronous and synchronous Digital circuit 57. Identify how to design and analyze asynchronous binary counters. 58. Explain how to design and analyze BCD asynchronous counters 59. Explain the Synchronous counters Binary Counters 2: bit, 3-bit. 60. Explain the types of shift registers and Shift register counters Ring Counter.
Indicative Contents	Indicative content includes the following. **Part A - Circuit Components and values**

المحتويات الإرشادية	Introduction to Digital Technique, Basic Definitions, System of Numbers, General number formula: Binary, octal, decimal & hexadecimal numbers, Numbers Base Conversion (Arithmetic operation in different numbers complements, binary codes, BCD, Ex-3, gray codes). [9 hrs.] : Revision problem and tutorial classes [6 hrs.] : Quizzes [1 hr.] **Part B- Circuit reduction** Boolean algebra: (Basic definitions, basic theorem & properties, Boolean functions), Canonical & Standard Forms Digital Logic Gates. [12 hrs.]: Revision problem and tutorial classes [8 hrs.]: Quizzes [1 hr.] **Part C- Circuit Theory** Karnaugh Maps (AND & OR implementation, don't care condition), Adders Arithmetic Operation (Sub tractors, half & full adders & Subtractors, binary parallel adders), Code Conversion (Even and odd party logic, decoders, encoders comparator, multiplexers & demultiplexers), Sequential Logic (Flip Flops (RS, T, D, JK...) Master slave FF, Counters, Shift registers).. [24 hrs.]: Revision problem and tutorial classes [16 hrs.]:Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراشي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراشي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراشي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراشي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem)	100		

الحمل الدراشي الكلي للطالب خلال الفصل	

As

Module Evaluation

تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	10	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects /	1	20% (20)	Continuous	All
	Report	1	10% (10)	2 to 12	All
Summative assessment	Midterm Exam	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Digital Technique, General number formula
Week 2	Numbers Base Conversion, Boolean algebra
Week 3	Canonical & Standard Forms Digital Logic Gates, Karnaugh Maps
Week 4	Adders Arithmetic Operation, Code Conversion
Week 5	Introduction to sequential logic circuit design Latches, S-R Latch, gated RS Latch
Week 6	Edge-triggered Flip-Flops, JK-FF and D-FF Flip-Flop Operating Characteristics
Week 7	Shift Register operation

Week 8	Mid-term Exam
Week 9	Types of shift registers, Shift register counters: Ring Counter
Week 10	Models of State Machines
Week 11	Asynchronous Counters: Ripple counter
Week 12	Synchronous counters: Binary Counters 2: bit, 3-bit
Week 13	BCD Counter
Week 14	Up/down counter
Week 15	Synchronous counters design
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Digital Fundamental: By Thomas L. Floyd 11th Edition Pearson Education Limited (2015)	Yes
Recommended Texts	Contemporary Logic Design, Randy Katz Addison Wesley Publishing Company1993	No
Websites	Introduction to Boolean algebra and logic design by Gerhard and Melvin	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physics II**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EE112**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	UGx11	UGI	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Ahmad Abduljabbar Ismael		**e-mail**	a.a.ismail@uomosul.edu.iq	
Peer Reviewer Name		Mr. Omar Turath	**e-mail**	omartawfeeq_1981@uomosul.edu.iq	
Scientific Committee Approval Date		10/06/2023	**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	52. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 53. To understand energy level and atomic structure through energy-band theory of materials. 54. This course deals with the basic concept and Internal structure of materials of materials including metals, insulators and semiconductors. 55. To understand electrical conduction and characteristics of the all materials such as conductivity, Mobility, energy distribution of electrons, Fermi levels, work function, and electronic emission. 56. To understand the intrinsic and extrinsic semiconductors parameters. 57. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 58. To model small signal and large signal of the active electronic devices such as DC load line and AC load line concept.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	61. Recognize the Semiconductors and compound semiconductors materials such as Si, Ge, and GaAs. 62. List the various terms associated with active electronics elements. 63. Summarize what is meant by an electronic circuit. 64. Describe energy band theory of all materials. 65. Discuss the various properties of diodes and transistors. 66. Explain the homo-junction and Hetero-junction materials such as PN junction diodes, PNP transistors, and NPN transistors. 67. Explain the other types of semiconductor diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Energy Level and Atomic Structure** The atom, models, wave nature of light, dual nature of matter, energy-band theory of metals, insulators and semiconductors, crystal structure, ionic, covalent and metallic bonding, energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions. [**8 hrs**.]

	Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part B- Electrical Conduction in Metals:** Mobility and conductivity, energy distribution of electrons, Fermi levels, work function, electronic emission. Semiconductors: Semiconductors materials (Si, Ge and compound semiconductors), extrinsic semiconductors, Fermi-level in semiconductor, diffusion and carrier life time, Hall effect. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part C- Semiconductor p-n Junction:** p-n junction in equilibrium, current-voltage characteristics, charge-control description of a diode, Transition and diffusion capacitance's, diode switching times, diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions. [**6 hrs**.] Revision problem and tutorial classes [**3 hrs**.] Quizzes [**1 hr**.] **Part D- Diode Circuit Applications:** Rectifiers, Zener diodes voltage regulators, clipping circuits, clamping circuits and wave form generation. Other Types of Semiconductor Diodes: Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic. Transistors Principle of Operation and type, Transistor biasing circuits, Application Circuit. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
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	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

As

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Energy Level and Atomic Structure: The atom, models, wave nature of light, dual nature of matter. Energy-band theory of metals, Insulators and semiconductors, Crystal structure, Ionic, Covalent and metallic bonding.
Week 2	Energy band of crystals, Internal structure of materials cell, packing miller indices, crystal planes and directions.
Week 3	Electrical Conduction in Metals: Mobility and conductivity, energy distribution of electrons.
Week 4	Electrical Conduction in Metals: Fermi levels, Work function, Diffusion Current, Electronic emission.
Week 5	Introduction of semiconductors: Semiconductors materials (Si, Ge and compound semiconductors).
Week 6	Introduction of semiconductors: Intrinsic semiconductors, and Fermi-level in semiconductor.
Week 7	Introduction of semiconductors: Extrinsic semiconductors, and Fermi-level in semiconductor.
Week 8	Introduction of semiconductors: Demonstrated of electrical conductance in semiconductors materials. Diffusion Current in semiconductors, carrier life time, and Hall effect.
Week 9	Introduction semiconductor P-N junction: P-N junction in equilibrium, current-voltage characteristics. charge-control description of a diode.
Week 10	Diffusion current, diffusion current density, draw Energy-band level. Transition and diffusion capacitance's, diode switching times.
Week 11	diode models, small-signal model and load line concept, and introduction to Hetero-junctions and double Hetero-junctions.
Week 12	Introduction of Diodes, current-voltage characteristics of diode. Forward and reverse biasing of diodes, Temperature effects for diode characteristics.
Week 13	Diode Circuit Applications: Rectifiers, clipping circuits, clamping circuits.
Week 14	Zener diodes voltage regulators, and wave form generation. Varactor diode, tunnel diode, photodiode and photovoltaic (solar) cell, Light emitting diode, metal electronic.
Week 15	Introduction of transistors, Principle of Operation and type. Current-Voltage characteristics of transistors, DC Load line with state Q-Point. Transistors biasing circuits.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh 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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Democracy and Human Rights الديمقراطية وحقوق الانسان			**Module Delivery**	
Module Type	Support			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOM1040				
ECTS Credits	2				
SWL (hr/sem)	50				
Module Level		1	**Semester of Delivery**		three
Administering Department			**College**		
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	10/7/2023		**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	The aim of studying the democracy and human rights topics is to: 1. **Understand** the concept of human rights and explore their sources, including international, regional, national, and religious sources. 2. **Define** administrative corruption, explore its types, and understand its detrimental effects on society. Study methods to combat administrative corruption and promote transparency, accountability, and good governance. 3. **Trace** the historical development and evolution of human rights, examining key milestones and movements that have shaped the modern understanding of human rights. 4. **Differentiate** between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. **Explore** legal, institutional, and societal guarantees to prevent human rights violations, including guarantees of human rights in Islam, national-level protections, and international safeguards. 6. **Comprehend** the concept of democracy, including its principles, values, and various forms of democratic governance such as direct, semi-direct, indirect, and digital democracy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After these module aims, students should be able to: 1. Demonstrate a comprehensive understanding of the concept of human rights and their sources, including international, regional, national, and religious sources. 2. Identify and explain the fundamental characteristics of human rights, such as universality, indivisibility, interdependence, and inalienability. 3. Analyze the historical emergence and evolution of human rights, including key milestones and movements that have shaped their development. 4. Differentiate between different categories of human rights, including civil and political rights, economic and social rights, and environmental, cultural, and developmental rights. 5. Evaluate and apply legal, institutional, and societal guarantees to prevent human rights violations, considering guarantees in Islam, at the national level, and within the international framework. 6. Understand and discuss the concept of democracy, including its principles, values, and different forms of democratic governance. 7. Evaluate the Islamic stance on democracy and engage in critical analysis of the strengths and weaknesses of the democratic system. 8. Recognize and assess the impact of administrative corruption on society and propose methods to combat and prevent corruption in administrative systems. 9. Demonstrate critical thinking skills by analyzing and evaluating different perspectives on human rights, democracy, and corruption. 10. Apply acquired knowledge and skills to promote and protect human rights,

	democracy, and good governance in personal, professional, and civic contexts. Overall, students should have a solid understanding of democracy and human rights, democracy, and corruption issues, and be able to apply this knowledge to contribute to the advancement of human rights and democratic values in society.
Indicative Contents المحتويات الإرشادية	The indicative content includes: 1. Definition and sources of democracy and human rights (international, regional, national, religious). [3h] 2. Characteristics of democracy and human rights: universality, indivisibility, interdependence, inalienability. [3h] 3. Emergence and evolution of human rights: historical development, key milestones, influential movements. [3h] 4. Types of human rights: civil and political, economic and social, environmental, cultural, and developmental. [3h] 5. Guarantees to prevent human rights violations: legal, institutional, societal safeguards, Islamic guarantees, national and international levels. [3h] 6. Concept of democracy: principles, values, forms of governance (direct, semi-direct, indirect). [3h] 7. Islamic stance on democracy: compatibility, strengths, weaknesses. [3h] 8. Critique of the democratic system: analysis of strengths and weaknesses. [3h] 9. Administrative corruption: definition, types, societal impact. [3h] 10. Methods to combat administrative corruption. [3h]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to learning and teaching strategies for a human rights module, there are several approaches can be taken to enhance understanding and engagement. Here are some effective strategies: 1. Interactive Discussions: Encourage students to actively participate in discussions, debates, and group activities. This promotes critical thinking, allows for different perspectives to be shared, and fosters a deeper understanding of human rights issues. 2. Case Studies: Present real-life case studies that highlight human rights violations or achievements. Analyzing these cases helps students apply theoretical concepts to practical situations and develops their problem-solving skills. 3. Research Projects: Assign research projects on specific human rights topics or issues. This encourages independent learning, critical analysis, and the development of research skills. 4. Collaborative Learning: Foster collaboration among students through group projects or assignments. This encourages teamwork, peer learning, and the exchange of diverse perspectives.

	5. Assessment Variety: Use a variety of assessment methods, including essays, presentations, debates, and quizzes, to assess students' understanding of human rights concepts and their ability to apply them to real-world situations.

Student Workload (SWL)
الحمل الدراشي للطالب

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
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

As

Module Evaluation
تقييم المادة الدراسية

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #2, 4, 6 and 8
	Assignments	2	20% (20)	3, 5, 8, 11, 13	LO # 1, 3, 7, 6, 9 and 10
	Projects / Lab.		10% (10)		
	Report	1	10% (10)	13	LO # 2,4,5,7,9and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week

	Material Covered
Week 1	Definition of human rights and sources of rights (international sources / regional sources / national sources / religious sources).
Week 2	Characteristics of human rights.
Week 3	The emergence and evolution of human rights.
Week 4	Types of human rights / civil and political rights. Economic and social rights. Environmental, cultural, and developmental rights.
Week 5	Guarantees to prevent human rights violations / guarantees of human rights in Islam.

Week 6	Guarantees for the protection of human rights at the national level.
Week 7	Guarantees of human rights at the international level.
Week 8	The concept of democracy.
Week 9	Characteristics of a democratic system.
Week 10	Forms of democratic governance (direct democracy / semi-direct democracy / indirect democracy).
Week 11	Digital democracy / definition and advantages and disadvantages of digital democracy / manifestations of digital democracy.
Week 12	The Islamic stance on democracy.
Week 13	Critique of the democratic system.
Week 14	Administrative corruption / definition and types.
Week 15	Methods to combat administrative corruption.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	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	ضمانات حقوق الانسان وحمايتها وفقا للقانون الدولي والتشريع الوطني / نبيل عبد الرحمن ناصر الدين	No
Recommended Texts	الديمقراطية وحقوق الانسان / د. امير عبد العزيز	No
Websites		

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

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**English language 1** **اللغة الانكليزية 1**			**Module Delivery**	
Module Type	**Support**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM1021**				
ECTS Credits	**2**				
SWL (hr./sem)	**50**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader			**e-mail**	البريد الالكتروني لرئيس القسم	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor			**e-mail**		
Peer Reviewer Name		اسم مُراجع الملف	**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date		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	59. To develop Communications skills in the English language. 60. To let the students able to read and write in correct Grammer. 61. To develop the skills of writing professional writing 62. To develop the skills of writing emails for future Engineers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	68. Learning Parts of Speech in English 69. Learn different tenses of verbs. 70. Learn active and passive voice. 71. Learn adjectives and adverbs. 72. Learn the correct prepositions. 73. Learn the correct articles
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – learn parts of speech** Nouns, verbs, adjectives, articles, pronouns. [9 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **Part B-different tenses** Present simple, present perfect, present continuous, past simple, past perfect, past continuous. [9 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part C- active and passive voice**

	Active and passive voice, since and for [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 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 communications skills. This will be achieved through classes, interactive involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراشي 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
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As

		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	10% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	1	20% (25)	Continuous	All

	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	8	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction
Week 2	Part of speech: Verbs present
Week 3	Part of speech: Verbs past
Week 4	Part of speech: perfect tenses
Week 5	Part of speech: Noun
Week 6	Part of speech: preposition
Week 7	Part of speech: adVerbs
Week 8	Mid-term Exam
Week 9	Part of speech: passive and active
Week 10	Part of speech: since and for
Week 11	Part of speech: articles
Week 12	Part of speech: conjunctions
Week 13	Writing an email
Week 14	Writing an email exercises
Week 15	Technique to fix Grammers.
Week 16	**Preparing week before the Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	NEW HEADWAY INTERMEDIATE	Yes
Recommended Texts	ENGLISH GRAMMAR IN USE	No
Websites	https://www.udemy.com/course/english-for-engineers/	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuits Analysis I** تحليل الدوائر الكهربائية I			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC201**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level		UGx11 Two	**Semester of Delivery**		Three
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omer S. Yehia		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Prof.	**Module Leader's Qualification**		Doctor
Module Tutor	Dr. Sarra Ismaiel Khalil		**e-mail**	saraa2020@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmed Salim Jarallah	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date		01/09/2023	**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	63. Transient Response of First-Order RL and RC circuits, Natural Response, Complete response. 64. Forced response and natural response of First-Order RL and RC circuits, General response, sequential switching. 65. Transient Response of Second Order RLC circuits, Natural response of series RLC circuits. 66. Analysis of overdamped, underdamped and critically damped RLC circuits. 67. Mutual Inductance, Mutual- and self-inductance equations. 68. Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer. 69. T- and PI model the ideal transformer: impedance matching. 70. Two-Port Networks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	74. Recognize how electricity works in electrical circuits. 75. List the various terms associated with electrical circuits. 76. Summarize what is meant by a basic AC electric circuit. 77. Describe electrical AC voltage, current and power. 78. Define Ohm's law in AC circuits. 79. Identify the basic circuit passive and active elements and their applications. 80. Discuss the various properties of impedance. 81. Explain the two Kirchhoff's laws used in AC circuit analysis. 82. Explain the Analysis Methods used in AC Electrical Circuits.
Indicative Contents المحتويات الإرشادية	1. Transient Response of First-Order RL and RC circuits, Natural Response, Complete response. [12 hrs.] 2. Forced response and natural response of First-Order RL and RC circuits, General response, sequential switching. [12 hrs.] + [1 hr. Quiz] 3. Transient Response of Second Order RLC circuits, Natural response of series RLC circuits. [12 hrs.] + [1 hr. Quiz]

	4. Analysis of overdamped, underdamped and critically damped RLC circuits. [12 hrs.] 5. Mutual Inductance, Mutual- and self-inductance equations. [12 hrs.] 6. Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer. [12 hrs.] + [1 hr. Quiz] 7. T- and PI model the ideal transformer: impedance matching. [12 hrs.] 8. Two-Port Networks. [12 hrs.] + [1 hr. Quiz]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	For Electrical Networks in electrical Engineering, students will learn: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. (1)

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	12% (12)	Continuous	LO #1, 5, 8 and 9
	Online Assignments	3	12% (12)	Continuous	LO #1, 2, 4, 6 7, 8

					and 9
	Onsite Assignments	1	4% (4)	Continuous	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	3	12% (12)	Continuous	All
	Report	---	---	---	---
Summative assessment	**Midterm Exam**	2 hr.	10% (10)	7	LO # 1-5
	Final Exam	3 hr.	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Transient Response of First-Order RL and RC circuits.
Week 2	Natural Response, and Complete response of First-Order RL and RC circuits.
Week 3	, General response, sequential switching of First-Order RL and RC circuits
Week 4	Forced response and natural response of First-Order RL and RC circuits
Week 5	Transient Response of Second Order RLC circuits
Week 6	Natural response of series RLC circuits. of Second Order RLC circuits, Natural response of series RLC circuits.
Week 7	Analysis of overdamped, underdamped and critically damped RLC circuits.
Week 8	Complete analysis of RLC circuits.
Week 9	Transient analysis of parallel RLC circuits.
Week 10	Coupling: Magnetic coupling, Coefficient of coupling, the linear transformer.
Week 11	T- and PI model the ideal transformer: impedance matching.
Week 12	Two-Port Networks.
Week 13	Terminal equations: a, b, y, z, g and h parameters.
Week 14	Analysis of a terminated 2-port network. Interconnected 2-port networks.

Week 15	Poly-phase Circuits: Single-phase and three phase wire system.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Engineering Circuit Analysis Eight Edition (William H. Hayt) 2012	Yes
Recommended Texts	Electric Circuits Tenth Edition (James W. Nilsson) 2015	No
Websites	Fundamentals of Electric Circuits (Charles K. Alexander) 2009	

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
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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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Mathematics III** **III الرياضيات**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEEC202		
ECTS Credits	**5**		
SWL (hr./sem)	**125**		

Module Level	2	**Semester of Delivery**	3
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Omar Sharaf Deen	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Ibrahim Ismael Alnaib	**e-mail**	ibrahim-85353@uomosul.edu.iq
Peer Reviewer Name	Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date	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	71. Develop problem-solving skills and understand partial differentiation. 72. Understand the chain rule and the total derivative. 73. Understand vectors and units, space coordinates, and space vectors. 74. Understand gradient, divergence, and Curl in curved coordinates. 75. Solving linear differential equations of the first and second order with constant coefficients. 76. Understanding Fourier series.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	83. Understand the concept of partial derivatives for functions of two or more variables. 84. Understand the concept of the total derivative and its relationship to partial derivatives. 85. Determine whether a critical point is a maximum, minimum, or saddle point using the second derivative test or other methods. 86. Understand vector representation and components in Cartesian coordinates. 87. Understand the geometric interpretation of the vector product. 88. Express gradient, divergence, and curl in terms of curvilinear coordinates. 89. Solve first and second-order linear differential equations with constant coefficients. 90. Understand the need for Fourier series in representing periodic functions. 91. Understand double integrals and their properties.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Partial Differentiation and Vectors** Partial Differentiation, function of two or more variables, partial derivatives, The Chain Rule

	and total Derivative, maxima, minima and saddle point, Vectors component and Units, Space coordinate and Space Vector, Scalar Product and Vector Product, Product of Three Vectors, Applications [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **Part B- Vector Calculus and Differential Equations** Vector Functions and Their Derivatives, Gradient of Scalar Field, Divergence of Vector Field, Curl of Vector Field, Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates, 1st and 2nd order linear differential equations. [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 hr.] **Part C- Fourier Series and Multiple Integrals** Fourier series, Periodic functions and Fourier Series-Euler formulas, Double integrals, areas, and volumes [20 hrs.] Revision problem and tutorial classes [5 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي 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	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (5*3)	2 to 12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	7	All
	Report	1	8% (1*8)	8	----
Summative assessment	**Midterm Exam**	2 hr	10% (1*10)	10	All
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Partial Differentiation: Function of two or more variables, partial derivatives.

Week 2	The Chain Rule and Total Derivative, Maxima, minima, and saddle points.
Week 3	Vectors: Vector components and units, Space coordinates and space vectors.
Week 4	Scalar Product and Vector Product, Units and plane equations.
Week 5	Equations of lines and planes, Product of Three Vectors, Applications of vectors.
Week 6	Vector Functions and Their Derivatives, Gradient of Scalar Field.
Week 7	Divergence of Vector Field, Curl of Vector Field.
Week 8	Mid-term Exam
Week 9	Directional Derivatives, Gradient, Divergence, and Curl in Curvilinear Coordinates.
Week 10	Introduction to Differential Equations, 1st and 2nd order linear differential equations.
Week 11	Application of differential equations to electrical systems.
Week 12	Transformation of higher order linear differential equations onto coupled differential equations.
Week 13	Periodic functions and Fourier Series-Euler formulas.
Week 14	Application of Fourier series in Electrical Engineering.
Week 15	Double integrals, areas, and volumes
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus By Thomas Finny 13th Edition, Pearson Publisher,2016.	No
Recommended Texts	Advanced Engineering Mathematics, 10th Edition, By Reyszig ERWIN, Publisher 2011.	No

Websites	

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

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics Principles** **مبادئ الالكترونيات**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC203**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		UGx11 2	**Semester of Delivery**		Three
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Firas Natheer Abdukadir		**e-mail**	firas_nadheer@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval		30/11/2023	**Version Number**	1.0	

Date			

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	77. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as RLC, diodes, transistors, and integrated circuits. 78. To understand the Basic Transistor Construction through graphical analysis of transistors Connections and biasing. 79. This course deals with the basic concept of the small-signal analysis of the transistors such as D.C. and A.C. Equivalent Circuits. 80. To understand the Load Line Analysis, Operating Point Transistor Parameters, and Rating Amplification Stabilization. 81. To understand the H-parameters, Hybrid Equivalent Circuit. Z-parameters, R-parameters Equivalent Circuit. 82. To perform current-voltage characteristics, charge control description for all types of both the diode and transistors. 83. To Describe and operation of the Multistage Transistor Amplifiers
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	92. Recognize the regions of operation, graphical analysis of BJT, regions of operation stability. 93. List the various terms associated with bias configuration of the transistors. 94. Summarize what is meant of the practical circuit of transistor amplifier. 95. Describe the types of multistage amplifiers. 96. Discuss the various properties of transistors used as an amplifier

	97. Explain the transistor construction and operation such as amplifier and switching. 98. Explain the operation of the linear amplifier through the a.c. load line and DC load line analysis.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **<u>Part A - Transistor Construction, Operation, and Stabilization</u>** Transistor Construction. Transistor Symbols. Transistor Operation. Transistor Connections: Common Base CB Connection, Common Emitter CE Connection, Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection. Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification. Stabilization, Stability Factor Methods of Transistor Biasing. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **<u>Part B- D.C and A.C Equivalent Circuits of the transistors</u>** Practical Circuit of Transistor Amplifier, D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit. r-parameters, r-parameters Equivalent Circuit. The Linear Amplifier. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **<u>Part C- Transistor Bias Configuration and Multistage Transistor Amplifiers</u>** The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration, Common-Emitter Emitter Bias Configuration, Common – Emitter Collector Feedback Configuration, Common – Emitter Voltage Divider Configuration. The Common – Collector Amplifier, the Common – Base Amplifier. Multistage Transistor Amplifiers. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	4,8,14	LO #1, 4, 6 and 7
	Assignments	3	12% (4)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Onsite	1	5% (5)	----	-----

	Assignments				
	Report	1	8% (8)	Continuous	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Transistor Construction. Transistor Symbols. Transistor Operation.
Week 2	Transistor Connections: Common Base CB Connection, Common Emitter CE Connection.
Week 3	Transistor Curves, Cutoff and Saturation. Transistor as a switch. Common Collector Connection.
Week 4	Transistor Load Line Analysis, Operating Point, Transistor Parameters and Rating Amplification.
Week 5	Stabilization, Stability Factor Methods of Transistor Biasing.
Week 6	Practical Circuit of Transistor Amplifier.
Week 7	D.C. and A.C. Equivalent Circuits. Transistor ac Equivalent Circuits.
Week 8	Transistor ac Equivalent Circuits h-parameters, Hybrid Equivalent Circuit.
Week 9	Transistor ac Equivalent Circuits, r-parameters, r-parameters Equivalent Circuit.
Week 10	The Linear Amplifier.
Week 11	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common Emitter Fixed Bias Configuration.
Week 12	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Emitter – Bias Configuration, Common – Emitter Collector Feedback Configuration.
Week 13	The a.c. Load Line, A.C. Analysis Using re Model for Transistor Common – Emitter Voltage Divider

	Configuration.
Week 14	The Common – Collector Amplifier, the Common – Base Amplifier.
Week 15	Multistage Transistor Amplifiers.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh 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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Communication Principles مبادئ الاتصالات			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code	EEEC204			☐ **Lecture**	
ECTS Credits	5			☐ **Lab**	
SWL (hr./sem)	125			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	3	
Administering Department	(Electrical Engineering)		**College**	(Engineering)	
Module Leader	Dr. Omer S. Yehia		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Phd	
Module Tutor	Dr. Omar Mustafa Ali		**e-mail**	omarmostafa@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmad Salam		**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date			**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	84. To develop problem solving skills and understanding of the propagation methods of electrical signals across transmission lines. 85. To understand the reflection in transmission line. 86. This course deals with the mathematical calculations for the propagation of signals through transmission lines. 87. This is the basic subject for all A.C. Steady state transmission line. 88. To understand crank method for the analysis of transmission lines. 89. To perform graphical solution of lossless transmission line using Smith chart. 90. To perform transmission line matching using Quarter Wave Transformer (λ/4).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	99. Know the propagation methods of electrical signals across transmission lines. 100. Conduct mathematical calculations for the propagation of signals through transmission lines. 101. Handling crank method in the analysis of transmission lines. 102. Use the Smith chart and its applications. 103. Identify types of electrical signals. 104. Analysis of electrical signals using Fourier series and Fourier transform.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Transmission Lines basics** Reflection in transmission line, Space-Time diagram (zig-zag), Discharge of transmission line.

	Transmission line equation, Propagation constant, Transmission line distortion, A.C. Steady state transmission line, Standing wave in transmission line. [16 hrs.] Revision problem and tutorial classes [4hrs.] Quizzes [1 hr.] **Part B- Transmission Lines analysis** Graphical solution of lossless transmission line using Crack diagram. Graphical solution of lossless transmission line using Smith chart. Graphical solution of lossy transmission line using Smith chart. Transmission line matching using Quarter Wave Transformer (λ/4). Transmission line matching using single stub. [16hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C- Signals and Systems** Signal classifications. Fourier series. Fourier Transform. Signals and linear systems. Power spectral density and Correlation. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for delivering this module will be to encourage students to participate in the exercises while also refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving some sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60+3=63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	125-63=62	**Unstructured SWL (h/w)**	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	5*25=125		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (5*3)	2 to 12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	7	All
	Report	1	8% (1*8)	8	----
Summative assessment	**Midterm Exam**	2 hr	10% (1*10)	10	All
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction, Transmission Line Analysis.
Week 2	Reflection in transmission line, Space-Time diagram (zig-zag).
Week 3	Discharge of transmission line.
Week 4	Transmission line equations

Week 5	Graphical solution of lossless transmission line using Crank diagram.
Week 6	Graphical solution of lossless transmission line using Smith chart.
Week 7	Graphical solution of lossy transmission line using Smith chart.
Week 8	Transmission line matching using Quarter Wave Transformer (λ/4).
Week 9	Transmission line matching using single stub.
Week 10	Mid-term Exam
Week 11	Signal classifications.
Week 12	Fourier Series.
Week 13	Fourier Transform.
Week 14	Signals and linear systems 1.
Week 15	Signals and linear systems 2.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	The fundamentals of signal transmission line by Lem Ibbotson, 1999. Modern digital and analog communication systems by Lathi, 1998. Communications Principles by Dr. Sami Mohamed, 1989. Transmission line and network by Johnson.	no
Recommended Texts	Transient signal on transmission lines by Peterson, 2009.	No
Websites		

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

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electromagnetic Fields** المجالات الكهرومغناطيسية			**Module Delivery**	
Module Type	**Basic learning activities**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC205**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		UGx11 2	**Semester of Delivery**		3
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya @uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PhD
Module Tutor	Dr Saad Wasmi Osman		**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date		01/09/2023	**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	91. To develop problem solving skills of coordinate systems through the understanding the rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. 92. To understand the vector analysis (scalars and vectors). 93. This course deals with the basic concept of the Electric Field Intensity, Electric Flux Density, magnetic Field Intensity, and magnetic Flux Density. 94. To understand the Energy and Potential. 95. To understand the electric fields in material space. conductors, dielectrics, and capacitance. 96. To perform the electric fields due to continuous charge distributions. 97. To understand the magnetic field due to different current distributions. 98. To understand different laws such as Coulomb's Law, Gauss's Law, Biot-Savart's Law, Ampere's Law, and Faraday's Law.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	105. Recognize the electric field, electric field intensity, and charge distributions. 106. Recognize the magnetic Field Intensity, and magnetic Flux Density 107. List the various terms associated with continuous charge and different current distributions. 108. Summarize what is meant by a coordinate system, scalars and vectors analysis, conductors, dielectrics, capacitance, and inductance. 109. Describe the electric flux density and gauss's law. magnetic Flux Density and Ampere's Law. 110. Discuss the various charge and current distributions such as line, sheet, and volume. 111. Explain the work, potential & potential difference. 112. Explain the electric fields in material space. conductors, dielectrics, and capacitance.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Coordinate systems and Vector analysis** coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors, vector algebra, vector components and unit vectors, vector addition and subtraction, vector multiplication. coulomb's law and electric force: the experimental law of coulomb. Magneto-statics: the static magnetic fields, biot-savart law. Magneto-statics: magnetic field due to different current distributions, right-hand rule. Magneto-statics: solenoid, applications of solenoid, toroid. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part B- Electric field intensity and Charge distributions** electric field intensity: electric field of a point charge, electric field of n point charges. electric fields due to continuous charge distributions: electric field of a line charge. electric fields due to continuous charge distributions: electric field of a sheet of charge. electric fields due to continuous charge distributions: electric field of a volume of charge. Magneto-statics: ampere's circuital law, applications of ampere's law: infinite line current, infinite sheet of current, infinitely long coaxial transmission line. Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid. [**8 hrs**.] Revision problem and tutorial classes [**4 hrs**.] Quizzes [**1 hr**.] **Part C- Electric flux density and Gauss's law application** Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge. electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge. work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Force on a moving charge. magnetic forces, work & power: work. magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force. [**6 hrs**.] Revision problem and tutorial classes [**3 hrs**.] **Part D- conductors, dielectrics, and capacitance** conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance: dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. conductors, dielectrics, and capacitance: capacitance and capacitors. Maxwell's equations: the vector operator (del) and the divergence theorem. Maxwell's equations: derivation of Maxwell's equations and applications. Maxwell's equations: the uniform plane wave. Maxwell's equations: wave propagation in free

	space. [**8 hrs.**] Revision problem and tutorial classes [**4 hrs.**] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
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	52	**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					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	3	15% (5*3)	4,8,14	LO #1, 4, 6 and 7

assessment	**Assignments**	3	12% (4*3)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Classwork	1	5% (1*5)	----	-----
	Report	1	8% (1*8)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	coordinate systems: rectangular coordinate system, cylindrical coordinate system, spherical coordinate system. vector analysis: scalars and vectors.
Week 2	Vector analysis: vector algebra, vector components and unit vectors, vector addition and subtraction. vector multiplication. coulomb's law and electric force: the experimental law of coulomb.
Week 3	Electric field intensity: electric field of a point charge, electric field of n point charges. Electric fields due to continuous charge distributions: electric field of a line charge. electric field of a volume of charge.
Week 4	Electric flux density and gauss's law: gauss's law application on a point charge, gauss's law application on a line charge.
Week 5	Electric flux density and gauss's law: gauss's law application on a surface charge. electric flux density and gauss's law: gauss's law application on a volume charge.
Week 6	Work, potential & potential difference: work done in moving a point charge. work, potential & potential difference: potential & potential difference. Conductors, dielectrics, and capacitance: electric fields in material space. conductors, dielectrics, and capacitance.
Week 7	dielectric – dielectric boundary conditions, conductor – dielectric boundary conditions, conductor – free space boundary conditions. Conductors, dielectrics, and capacitance: capacitance and capacitors.
Week 8	Magneto-statics: the static magnetic fields, biot-savart law. magnetic field due to different current distributions. right-hand rule. solenoid, applications of solenoid, toroid. ampere's circuital law, applications of ampere's law. applications of ampere's law: infinite line current, infinite sheet of current. infinitely long coaxial transmission line.
Week 9	Magneto-statics: magnetic flux and magnetic flux density. inductance: inductance of a conductor, inductance of toroid.
Week 10	Magnetic forces, work & power: force on a moving charge. work and power.
Week 11	Magnetic forces, work & power: power. time varying fields: faraday's law. time varying fields: induced electromotive force.

Week 12	Maxwell's equations: the vector operator (del) and the divergence theorem
Week 13	Maxwell's equations: derivation of Maxwell's equations and applications.
Week 14	Maxwell's equations: the uniform plane wave.
Week 15	Maxwell's equations: wave propagation in free space.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	William H. Hayt "Engineering Electromagnetics" 4th edition	Yes
Recommended Texts	Schaum's outline of theory and problems of Electromagnetics	Yes
Websites	Nefyodov, Eugene I., and Sergey Smolskiy. Electromagnetic fields and waves. Springer, 2019.	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية				
Module Title	**Electrical Engineering Lab. I** مختبرات الهندسة الكهربائية I		**Module Delivery**	
Module Type	**Core**		☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC206**			
ECTS Credits	**3**			
SWL (hr./sem)	**75**			
Module Level	UGx11 2	**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Doctor	
Module Tutor	Dr. Ahmed Salim Jarallah	**e-mail**	Ahmed.salim@uomosul.equ.iq	
Peer Reviewer Name	Dr. Ahmed Salim Jarallah	**e-mail**	Ahmed.salim@uomosul.equ.iq	
Scientific Committee Approval Date	28/01/2026	**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	99. To handle laboratory equipment and electrical elements professionally and scientifically. 100. To analyze electrical circuits and comprehend their operational principles. 101. To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 102. To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 103. To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	113. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 114. Ability to analyze electrical circuits and understand the nature of their work(ii). 115. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 116. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 117. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents	Indicative content includes the following.

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 الدراشي 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	42	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية				
	Time/ Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

As					
Formative assessment	**Quizzes**	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0%(0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (10)	---	---
Summative assessment	**Midterm Exam**	2Hr	10% (10)	7	LO # 1-5
	Final Exam	3Hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Introduction & representation about first group of experiments
Week 2	Thevenin theory in AC circuits
Week 3	Measurement of power factor in electrical networks
Week 4	Study of I-V characteristics of normal diode & zener diode
Week 5	First quiz
Week 6	Introduction & representation about second group of experiment
Week 7	Diode application I: Rectifier filters
Week 8	Diode application II: Clipping & clamping circuits
Week 9	Transient condition for R-L & R-C circuits
Week 10	Second quiz + first term theoretical exam. for 1st &2nd group
Week 11	First term practical exam
Week 12	Introduction & representation about third group of experiment
Week 13	Transient condition for RLC circuits
Week 14	Transformer tests: open, short & load test
Week 15	Study of common emitter transistor characteristics

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Electrical technology (twenty-third edition) BL.THERAJA,AK. THERAJA S. Chand and company Ltd. (2005), ISBN: 81-219-2440-5. • Electronics devices (Ninth edition) by Thomas L. Floyd (2012), Prentice Hall ISBN-13: 978-0-13-254986-8.	No
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound works 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.

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Arabic Language 2** **اللغة العربية 2**		**Module Delivery**
Module Type	Basic		☒ **Theory**
Module Code	**UOM2012**		
ECTS Credits	50		
SWL (hr./sem)	**2**		
Module Level	**2**	**Semester of Delivery**	**3**
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya @uomosul.edu.iq
Module Leader's Acad. Title	Assistant Prof.	**Module Leader's Qualification**	Phd
Module Tutor	سوسن أمين خضر	**e-mail**	sausan.zakar@uomosul.edu.iq
Peer Reviewer N	Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date	26/01/2023	**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	1- تنمية مهارات الطلبة في استخدام اللغة العربية استخدامًا سليمًا في السياقات الأكاديمية والعلمية. 2- تمكين الطلبة من فهم النصوص العلمية والهندسية المكتوبة باللغة العربية وتحليلها. 3- تطوير قدرة الطلبة على التعبير الكتابي والشفهي بأسلوب واضح ودقيق. 4- تعزيز مهارات الكتابة الوظيفية المرتبطة بالتخصص الهندسي مثل التقارير والمراسلات الرسمية. 5- ترسيخ قواعد اللغة العربية الأساسية بما يخدم التواصل العلمي والمهني. 6- تنمية مهارات التفكير النقدي والتحليل اللغوي لدى الطلبة. 7- تعزيز الثقة بالنفس في استخدام اللغة العربية في العروض والمناقشات العلمية.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- يميز بين بناء الفعل للمعلوم وبنائه للمجهول، ويستخدم كليهما استخدامًا صحيحًا في الجمل والنصوص الوظيفية. 2- يتعرف على أقسام الأفعال في اللغة العربية (ماضٍ، مضارع، أمر) ويفرق بينها من حيث الصيغة والدلالة والاستعمال. 3- يحدد علامات الجزم وعلامات النصب للأفعال المضارعة، ويطبقها تطبيقًا سليمًا في الكتابة الأكاديمية. 4- يستخدم الأعداد في اللغة العربية استخدامًا صحيحًا من حيث التذكير والتأنيث، والإعراب، وتمييز العدد. 5- يفرق بين حرفي الضاد والظاء نطقًا وكتابةً، ويتجنب الأخطاء الشائعة المرتبطة بهما. 6- يوظف علامات الترقيم توظيفًا صحيحًا في النصوص الكتابية بما يحقق الوضوح والدقة في المعنى. 7- يتعرف على الأغلاط اللغوية الشائعة في الاستعمال الكتابي والشفهي، ويصححها وفق القواعد اللغوية. 8- يميز بين المفعول فيه (الظرف) والمفعول معه من حيث التعريف والدلالة والإعراب. 9- يعرب الجمل التي تحتوي على المفاعيل المختلفة إعرابًا صحيحًا.

10- يطبق القواعد النحوية المدروسة في صياغة جمل ونصوص علمية ووظيفية سليمة لغويًا. 11- ينمي مهارته في التحليل اللغوي وربط القاعدة بالتطبيق العملي. 12- يظهر دقة لغوية ومسؤولية أكاديمية في الكتابة والتعبير	
. بناء الفعل في اللغة العربية • تعريف الفعل المعلوم والفعل المجهول • صيغ بناء الفعل للمعلوم • صيغ بناء الفعل للمجهول • تحويل الفعل من المعلوم إلى المجهول • تطبيقات لغوية من نصوص علمية ووظيفية 2. أقسام الأفعال في اللغة العربية • الفعل الماضي: خصائصه ودلالاته • الفعل المضارع: خصائصه ودلالاته • فعل الأمر: صوغه واستعماله • دلالة الزمن في الأفعال • تطبيقات عملية على استعمال الأفعال 3. نصب الفعل المضارع وجزمه • أدوات نصب الفعل المضارع • علامات النصب الأصلية والفرعية • أدوات جزم الفعل المضارع • علامات الجزم الأصلية والفرعية • الفرق بين النصب والجزم في الاستعمال • تمارين تطبيقية وإعرابية 4. الأعداد في اللغة العربية • تعريف العدد وتمييزه • أنواع الأعداد (المفردة، المركبة، المعطوفة، العقود) • تذكير العدد وتأنيثه • إعراب الأعداد وتمييزها • أخطاء شائعة في استعمال الأعداد • تطبيقات من السياقات العلمية والهندسية	**Indicative Contents** المحتويات الإرشادية

5. الضاد والظاء • الفرق الصوتي والكتابي بين الضاد والظاء • مواضع شيوع كل حرف • كلمات شائعة يخطئ فيها الطلبة • تدريبات على النطق والكتابة الصحيحة 6. علامات الترقيم • مفهوم علامات الترقيم وأهميتها • الفاصلة، الفاصلة المنقوطة، النقطة • علامة الاستفهام والتعجب • النقطتان، الأقواس، الشرطة • توظيف علامات الترقيم في النصوص العلمية 7. الأغلاط اللغوية الشائعة • أخطاء نحوية شائعة في الكتابة • أخطاء إملائية وصرفية • أخطاء في التراكيب والأساليب • أساليب تصحيح الأخطاء اللغوية 8. المفاعيل في اللغة العربية • المفعول فيه (الظرف): تعريفه وأنواعه • المفعول معه: تعريفه ودلالته • الفرق بين المفعول فيه والمفعول معه • إعراب المفاعيل وتطبيقاتها • أمثلة من النصوص العلمية والوظيفية 9. التطبيقات اللغوية • تحليل نصوص مختارة • إعراب جمل مختارة • كتابة جمل ونصوص قصيرة وفق القواعد المدروس	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	17	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	33	**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					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5*3)	2 to 12	L0#1-4-6-7
	Assignments	3	12% (4*3)	2 to 12	L0#1-4-6-7
	Classwork	1	5% (1*5)	7	-----
	Report	1	8% (1*8)	8	-----

Summative assessment	**Midterm Exam**	2 hr	10% (1*10)	10	LO#4-7
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100%		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	بناء الفعل للمعلوم والمجهول
Week 2	أقسام الأفعال في العربية
Week 3	علامات الجزم في اللغة العربية
Week 4	علامات النصب في اللغة العربية
Week 5	الأعداد في اللغة العربية
Week 6	الفرق بين الضاد والظاء
Week 7	علامات الترقيم
Week 8	أغلاط شائعة
Week 9	المفعول فيه
Week 10	المفعول معه
Week 11	المفعول لأجله
Week 12	من القرآن الكريم -سورة الاسراء
Week 13	من الأحاديث النبوية – ان الله يحب اذا عمل احدكم عملا ان يتقنه

Week 14	من النصوص الأدبية- دالية أبي العلاء المعري
Week 15	من النصوص الأدبية- رُب ليل كأنه الصبح في الحُسن
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	جامع الدروس العربية لمصطفى الغلاييني	
Recommended Texts	مغني اللبيب لابن هشام/ شرح ابن عقيل	
Websites	المكتبة الشاملة	

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.

نموذج وصف المقرر

1. اسم المقرر
جرائم نظام البعث في العراق
2. رمز المقرر
UOM2050
3. الفصل / السنة
2025-2026
4. تاريخ إعداد هذا الوصف
15/09/2025
5. أشكال الحضور المتاحة
جماعي
6. عدد الساعات الدراسية (الكلي)/ عدد الوحدات (الكلي)
اربعة عشرة ساعة – 14 ساعة
7. اسم مسؤول المقرر الدراسي (اذا اكثر من اسم يذكر)
الاسم: وسام جمال حسين الآيميل: wisam.jamal@uomosul.edu.iq
8. اهداف المقرر

اهداف المادة الدراسية	• **توعية. .الطلاب بالجرائم التي ارتكبها البعث في العراق..** • **توجيــه الطلاب للإلمــام والمعرفــة بالجرائم.....** • **.توعية الطلاب بخطورة الجرائم....**

9. استراتيجيات التعليم والتعلم

الاستراتيجية	من خلال الكتاب المقرر

10. بنية المقرر

الأسبوع	**الساعات**	**مخرجات التعلم المطلوبة**	**اسم الوحدة او الموضوع**	**طريقة التعلم**	**طريقة التقييم**
الأسبوع الأول	2		مفهوم الجرائم واقسامها	عرض محاضرات ومشاركات صفية	
الأسبوع الثاني	2		أنواع الجرائم الدولية	=	محاضرة مكتوبة
الثالث	2		الجريمة السياسية	=	=
الرابع	2		امتحان	=	
الخامس	2		الجريمة الاجتماعية	=	=
السادس	2		جريمة قمع الانتفاضة	=	=

			الشعبانية		
السابع	2				=
			الجرائم النفسية واثارها	=	
الثامن	2				=
			جرائم نظام البعث وفق قانون المحكمة	=	
التاسع	2		الجنائية العراقية العليا 2005		=
				=	
العاشر	2		جرائم احاث صلاة الجمعة		=
				=	
الحادي عشر	2		جرائم المقابر الجماعية		=
				=	
الثاني عشر	2		قصف العتبات المقدسة	=	=
الثالث عشر	2		الهجوم الكيمائي على حلبجة	=	=
الرابع عشر	2		استعمال الأسلحة المحرمة دوليا		
الخامس عشر	2		امتحان	=	=
	2		الجرائم البيئية لنظام البعث في العراق		
			احداث المقابر والابادة الجماعية		=

			المرتكبة من النظام البعثي في العراق	=	

11. تقييم المقرر

توزيع الدرجة من 100 على وفق المهام المكلف بها الطالب مثل التحضير اليومي والامتحانات اليومية والشفوية والشهرية والتحريرية والتقارير

1.الامتحان النظري داخل القاعة .

2.الامتحان اليومي

3.اعداد النشاط داخل الصف

4.السؤال والجواب والمشاركة

5.الامتحان الشهري... الخ

12. مصادر التعلم والتدريس

الكتب المقررة المطلوبة (المنهجية أن وجدت)	كتاب المقرر جرائم نظام البعث في العراق من قبل وزارة التعليم العالي والبعث العلمي
المراجع الرئيسة (المصادر)	
الكتب والمراجع الساندة التي يوصى بها (المجلات العلمية، التقارير....)	
المراجع الإلكترونية ، مواقع الانترنيت	

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Circuit Analysis II** تحليل الدوائر الكهربائية II			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC208**				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level		2	**Semester of Delivery**		4
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya @uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PhD
Module Tutor	Dr. Sarra Ismaiel Khalil		**e-mail**	saraa2020@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval		01/09/2023	**Version Number**		1.0

Date			

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	This course equips students with the skills to analyze circuits in the S-domain, apply transfer functions, and calculate system outputs using partial fractions and convolution. It covers sinusoidal steady-state response, frequency response, and the design of first-order RL and RC filters. Students will study resonance in series and parallel circuits, Bode plot scaling, and key parameters like resonant frequency, Q-factor, and bandwidth. The course also introduces passive and active filter design, the use of OPAMPs as amplifiers and buffers, and the implementation of Butterworth and cascaded filters for practical applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Analyze electrical circuits in the S-domain using Laplace transform techniques. Apply transfer functions to model linear systems and determine their dynamic behavior. Calculate system outputs using partial fraction expansion and convolution methods. Analyze sinusoidal steady-state responses and evaluate circuit behavior in the frequency domain. Design and analyze first-order RL and RC filters and assess their performance characteristics. Understand and analyze resonance phenomena in series and parallel RLC circuits. Interpret and construct Bode plots, including magnitude and phase scaling. Evaluate key resonance parameters such as resonant frequency, quality factor (Q-factor), and bandwidth. Design and implement passive and active filters for practical engineering applications. Use operational amplifiers (OPAMPs) as amplifiers and buffers in analog circuit design. Design and analyze Butterworth filters and cascaded filter structures to meet specific frequency response requirements.

Indicative Contents المحتويات الإرشادية	1. Transient response of first-order RL and RC circuits: natural response and complete response. [12 hrs.] 2. Forced and natural response of first-order RL and RC circuits: general response and sequential switching. [12 hrs.] + [1 hr. Quiz] 3. Transient response of second-order RLC circuits: natural response of series RLC circuits. [12 hrs.] + [1 hr. Quiz] 4. Analysis of overdamped, underdamped, and critically damped RLC circuits. [12 hrs.] 5. Mutual inductance: self-inductance and mutual inductance equations. [12 hrs.] 6. Magnetic coupling: coefficient of coupling and linear transformer. [12 hrs.] + [1 hr. Quiz] 7. Ideal transformer models: T-model and π-model, impedance matching. [12 hrs.] 8. Two-port networks and their applications. [12 hrs.] + [1 hr. Quiz]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	For Electrical Networks in electrical Engineering, students will learn: An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. (1)

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Analysis of circuits in S-domain circuit elements.
Week 2	Applications the transfer function.

Week 3	Output calculation using partial fraction.
Week 4	Output calculation using convolution integral.
Week 5	Sinusoidal steady state response from TF.
Week 6	Frequency Response.
Week 7	First- Order RL and RC filters.
Week 8	Series resonance other resonance from scaling bode plots.
Week 9	Parallel RLC resonant circuit resonant frequency: Q-factor, bandwidth cutoff frequencies.
Week 10	Passive filter design.
Week 11	Active filter design.
Week 12	First – order low- pass and high – pass filter.
Week 13	The use of OPAMP as amplifier and Buffer.
Week 14	Butterworth filter.
Week 15	Cascaded filter.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. **William H. Hayt, Jack E. Kemmerly, Steven M. Durbin** – *Engineering Circuit Analysis*, McGraw-Hill Education. 2. **Charles K. Alexander, Matthew N. O. Sadiku** – *Fundamentals of Electric Circuits*, McGraw-Hill Education. 3. **Richard C. Dorf, James A. Svoboda** – *Introduction to Electric Circuits*, Wiley. 4. **Robert L. Boylestad** – *Introductory Circuit Analysis*, Pearson. 5. **Sergio Franco** – *Design with Operational Amplifiers and Analog Integrated Circuits*,	

	McGraw-Hill Education. 6. **A. Bruce Carlson** – *Circuits: Engineering Concepts and Analysis of Linear Electric Circuits*, Thomson Engineering. 7. **Leonard S. Bobrow** – *Foundations of Electrical Engineering*, Oxford University Press. **Allan H. Robbins, Wilhelm C. Miller** – *Circuit Analysis: Theory and Practice*, Cengage Learning	
Websites	https://www.allaboutcircuits.com/ https://www.electronics-tutorials.ws/	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics IV** **IV الرياضيات**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEEC209				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level		Basic learning activities	**Semester of Delivery**		4
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Omar Sharaf Deen		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Ibrahim Ismael Alnaib		**e-mail**	ibrahim-85353@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval		01/06/2023	**Version Number**	1.0	

Date			

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	104. To develop problem-solving of Eigenvalues and eigenvectors 105. To understand Laplace Transforms. 106. This course deals with the basic concept of DC electrical circuits. 107. To understand the application of Laplace Transforms in electronic circuits. 108. To understand the Fourier, transform and their applications in electrical engineering
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize Eigenvalues and eigenvectors. 2. Summarize series and series geometric. 3. Identify the Laplace Transforms. 4. Identify the Fourier transform their applications. 5. Identify the application in Electrical Circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Eigenvalues and eigenvectors; diagonalization. Sequence and series, sequence convergence, series geometric series, nth partial sum, test of convergence, Laplace Transforms: Introduction to transforms and operators, Laplace transforms of basic functions; unit step function, transforms of 1st and 2nd derivatives, Application

	to electric circuits; Transforms of piecewise continuous functions Inverse Laplace transforms, derivation using partial fractions. Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering. Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.
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 الدراشي 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	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5*3)	4,8,12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	Continuous	All
	Report	1	8% (1*8)	----	----
Summative assessment	**Midterm Exam**	2 hr	10% (1*10)	8	All
	Final Exam	3hr	50% (1*50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Sequence and series, sequence convergence,
Week 2	series geometric series, nth partial sum, test of convergence,
Week 3	Taylor and Mandarin series,
Week 4	Eigenvalues and eigenvectors; diagonalization.
Week 5	Introduction to transforms and operators, Laplace Transforms
Week 6	Laplace transforms of basic functions
Week 7	unit step function, transforms of 1st and 2nd derivatives
Week 8	Mid-term Exam
Week 9	Inverse Laplace transforms,
Week 10	Application to electric circuits;
Week 11	Direct (s-domain) analysis of electrical circuits, Interpretation of s-domain functions Initial & final value theorems
Week 12	derivation using partial fractions

Week 13	Transforms of piecewise continuous functions.
Week 14	Fourier transform: Introduction, Fourier transform equation, properties,
Week 15	Fourier transform for different functions (unit step function, unit impulse function, singularity function, applications in electrical engineering.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics, 10th Edition, By Reyszig ERWIN, Publisher 2011.	No
Recommended Texts	Calculus By Thomas Finny 13th Edition, Pearson Publisher, 2016.	No
Websites		

Grading Scheme

مخطط الدرجات

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

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Electronic Circuits **دوائر الكترونية**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC210**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		UGx11 2	**Semester of Delivery**		4
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Firas Natheer Abdukadir		**e-mail**	firas_nadheer@uomosul.edu.iq	
Peer Reviewer Name		Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date		30/11/2025	**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	109. To develop problem solving skills of the Field Effect Transistors through the basic operation, Symbols, and current-voltage Characteristics. 110. To understand Basic Junction Field Effect Transistor (JFET) through graphical analysis, Connections, and biasing circuits. 111. This course deals with the basic concept of the Field Effect Transistors FET, Junction Field Effect Transistor JFET, Metal Oxide Semiconductor FET (MOSFET), and Tuned Amplifiers. 112. To understand the D.C. And A.C. Equivalent Circuits of the FET, JFET, MOSFET. 113. To understand the Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. 114. To perform the Equations for Trans conductance Curve. 115. To Describe and operation of High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	118. Recognize the classes of the Frequency Response of the Amplifiers. 119. List the various terms associated with transistor amplifiers. 120. Summarize what is meant by an active electronic device such as FET, JFET, and MOSFET. 121. Describe the types of MOSFET Biasing Circuits. 122. Discuss the various properties of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. 123. Explain the Small – Signal Model of FET, JFET, and MOSFET.

	124. Explain the Types of MOSFET and operation modes.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Field Effect Transistors** Types of Field Effect Transistors: Junction Field Effect Transistor JFET, Basic Structure, Basic Operation, JFET Symbols. Difference Between JFET and Bipolar Transistor JFET Characteristics Important Terms (IDSS, VP, VGS (off) Expression for Drain Current ID Advantages of JFET Parameters of JFET, Relation Among JFET Parameters, Variation of Trans conductance gm of JFET. JFET Biasing Circuit: JFET Biasing by Bias Battery, Self – Bias for JFET, JFET with Voltage – Divider Bias. JFET Connections: Common Source Connection, Common Gate Connection, Common Drain Connection. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- D.C. And A.C. Equivalent Circuits of JFET and Introduction of MOSFET** Practical JFET Amplifier, D.C. And A.C. Equivalent Circuits of JFET. D.C. Load Line Analysis JFET Small – Signal Model JFET A.C. Equivalent Circuit Fixed – Bias Configuration Self – Bias Configuration Voltage – Divider Configuration Common – Gate Configuration Source – Follower (Common – Drain) Configuration JFET Applications. Metal Oxide Semiconductor FET (MOSFET): Types of MOSFET D – MOSFET, Circuit Operation of D – MOSFET. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part C- Depletion and Enhancement Mode MOSFET, and Frequency Equivalent Circuit** Depletion Mode, Enhancement Mode D – MOSFET. Transfer Characteristic D – MOSFET. Biasing D – MOSFET Small – Signal Model E – MOSFET, Operation, Schematic Symbols, Equation for Trans conductance Curve. E – MOSFET Biasing Circuits E – MOSFET Small – Signal Model, E – MOSFET Drain – Feedback Configuration, E – MOSFET Voltage – Divider Configuration E – MOSFET Versus D – MOSFET Tuned Amplifiers, Single – Tuned Amplifiers, Double – Tuned Amplifiers Introduction to Four – Layer Devices Description and Operation of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**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					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (15)	4,8,14	LO #1, 4, 6 and 7
	Assignments	3	12% (12)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Onsite Assignments	1	5% (5)	----	-----
	Report	1	8% (8)	Continuous	All
Summative	**Midterm Exam**	2 hr	10% (10)	7	LO # 4-7

assessment	**Final Exam**	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Types of Field Effect Transistors: Junction Field Effect Transistor JFET, Basic Structure, Basic Operation, JFET Symbols
Week 2	Junction Field Effect Transistors: Difference Between JFET and Bipolar Transistor. JFET Characteristics Important Terms (IDSS, VP, VGS (off).
Week 3	Junction Field Effect Transistors: Expression for Drain Current ID Advantages of JFET Parameters of JFET, Relation Among JFET Parameters, Variation of Trans conductance gm of JFET.
Week 4	Junction Field Effect Transistors: JFET Biasing Circuit: JFET Biasing by Bias Battery, Self – Bias for JFET, JFET With Voltage – Divider Bias.
Week 5	Junction Field Effect Transistors: JFET Connections: Common Source Connection, Common Gate Connection, Common Drain Connection.
Week 6	Junction Field Effect Transistors: Practical JFET Amplifier, D.C. And A.C. Equivalent Circuits of JFET. D.C. Load Line Analysis.
Week 7	Junction Field Effect Transistors: JFET Small – Signal Model, JFET A.C. Equivalent Circuit Fixed – Bias Configuration Self – Bias Configuration Voltage – Divider Configuration
Week 8	Junction Field Effect Transistors: Common – Gate Configuration Source – Follower (Common – Drain) Configuration.
Week 9	Junction Field Effect Transistors: JFET Applications.
Week 10	(MOSFET): Types of MOSFET D – MOSFET, Circuit Operation of D – MOSFET.

Week 11	(MOSFET): Depletion Mode, Enhancement Mode D – MOSFET. Transfer Characteristic D – MOSFET. Biasing D – MOSFET Small – Signal Model E – MOSFET.
Week 12	Metal Oxide Semiconductor FET (MOSFET): Operation, Schematic Symbols, Equation for Trans conductance Curve. E – MOSFET Biasing Circuits E – MOSFET Small – Signal Model, E – MOSFET Drain – Feedback Configuration.
Week 13	Metal Oxide Semiconductor FET (MOSFET): E – MOSFET Voltage – Divider Configuration, E – MOSFET Versus D – MOSFET Tuned Amplifiers, Single – Tuned Amplifiers.
Week 14	Metal Oxide Semiconductor FET (MOSFET): Double – Tuned Amplifiers Introduction to Four – Layer Devices.
Week 15	Description and Operation of Silicon Controlled Rectifier, Diac, Thyristor, GTO and Triac. High Frequency Equivalent Circuit, Low – Frequency Equivalent Circuit.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series).	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA.	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh 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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Analoge Communication الاتصالات التناظرية			**Module Delivery**	
Module Type	Core			☒ **Theory**	
Module Code	EEEC211			☐ **Lecture**	
ECTS Credits	5			☐ **Lab**	
SWL (hr./sem)	125			☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	2		**Semester of Delivery**	4	
Administering Department	(Electrical Engineering)		**College**	(Engineering)	
Module Leader	Dr. Omer S. Yehia		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Proff.		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Omar Mustafa Ali		**e-mail**	omarmostafa@uomosul.edu.iq	
Peer Reviewer Name	Dr. Ahmad Salam		**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date			**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	116. Analyze the fundamental principles and types of Amplitude Modulation (AM) 117. Evaluate Angle Modulation techniques, specifically FM and PM. 118. Determine bandwidth and power requirements for communication systems 119. Characterize noise and its statistical properties in communication channels 120. Assess system performance through SNR and Noise Figure 121. Compare noise immunity across different modulation schemes 122. Explore practical multiplexing and receiver architectures
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	125. Differentiate between various modulation schemes based on mathematical and spectral characteristics. 126. Calculate bandwidth and power requirements for analog communication systems. 127. Design and analyze circuits for signal generation and recovery. 128. Model and quantify the impact of noise on communication channels. 129. Evaluate system performance using Signal-to-Noise Ratio (SNR) and Noise Figure. 130. Compare and contrast the noise immunity of different modulation techniques.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Amplitude Modulation (AM) and Multiplexing** Principles of Amplitude Modulation, Double Sideband Large Carrier (DSB-LC) and Suppressed Carrier (DSB-SC). Single Sideband (SSB) and Vestigial Sideband (VSB) modulation. Generation techniques including nonlinear Power-Law devices and piece-wise switching modulators. Power distribution analysis, transmission efficiency, and the "useful" vs "useless" power distinction. Detection methods: envelope

	detectors for large signals and synchronous detectors for suppressed carriers. Frequency Division Multiplexing (FDM) and receiver architectures including Tuned Radio Frequency (TRF) and Superheterodyne receivers. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part B - Angle Modulation and Spectral Analysis** Definitions of Phase Modulation (PM) and Frequency Modulation (FM). Analysis of Single Tone Frequency Modulation, modulation index β, and frequency deviation. Comparison of Narrow Band FM (NBFM) and Wide Band FM (WBFM) using Fourier Series and Bessel functions of the first kind Jn(β). Bandwidth estimation using Carson's Rule and significant sideband analysis. Implementation of FM transmitters: Indirect method using frequency multipliers and Direct method using Voltage Controlled Oscillators (VCO) and varactor diodes. FM demodulation and the primary function of discriminators. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.] **Part C - Noise Analysis and System Performance** Classification of noise into man-made and naturally occurring sources (Thermal/Johnson noise). Statistical characterization of noise: Mean value, Variance, and Power Spectral Density (PSD). White noise modeling in linear time-invariant (LTI) systems and equivalent noise bandwidth. Performance metrics: Signal-to-Noise Ratio (SNR), Noise Figure (F), and Effective Noise Temperature (Te) for cascaded systems. Evaluation of noise immunity in receivers: 3dB SNR improvement in DSB-SC synchronous detection and the noise quieting effect in FM systems. [16 hrs.] Revision problem and tutorial classes [4 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy for delivering this module will be to encourage students to participate in the exercises while also refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving some sampling activities that students find interesting.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60+3=63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	125-63=62	**Unstructured SWL (h/w)**	4

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	5*25=125		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	15% (5*3)	2 to 12	All
	Assignments	3	12% (4*3)	2 to 12	All
	Classwork	1	5% (1*5)	7	All
	Report	1	8% (1*8)	8	----
Summative assessment	**Midterm Exam**	2 hr	10% (1*10)	10	All
	Final Exam	3hr	50% (1*50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Modulation/Demodulation of AM-DSB, frequency spectrum, average power.
Week 2	Modulation/Demodulation of AM-DSB/SC, frequency spectrum, average power.
Week 3	Modulation/Demodulation of AM-SSB/SC, frequency spectrum, average power.
Week 4	Modulation/Demodulation of AM-VSB, frequency spectrum, FDM.

Week 5	Phase modulation, Frequency modulation
Week 6	Single tone frequency modulation.
Week 7	Modulation/Demodulation of Narrow Band FM, frequency spectrum, average power.
Week 8	Modulation/Demodulation of Wide Band FM
Week 9	FM frequency spectrum, average power.
Week 10	Mid-term Exam
Week 11	Definition of Noise, Statistical Description of Signals
Week 12	Noise in Linear Systems, Naturally Occurring Noise
Week 13	Representation of Band limited Noise.
Week 14	Signal to Noise Ratios in AM Reception.
Week 15	Signal to Noise Ratios in FM Reception.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Communications Principles by Dr. Sami Mohamed, 1989.	no
Recommended Texts	Modern digital and analog communication systems by Lathi, 1998.	No
Websites		

Grading Scheme

مخطط الدرجات

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

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Electrical Measurements** قياسات كهربائية	**Module Delivery**	
Module Type	**Basic learning activities**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC212**		
ECTS Credits	**3**		
SWL (hr./sem)	**75**		

Module Level	2	**Semester of Delivery**	4
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Dr. Omar Sh. AL-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Doctoral Degree
Module Tutor	Dr. Wael Hashem Hamdon	**e-mail**	waelhashem_67@uomosul.edu.iq
Peer Reviewer Name	Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date		**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Basics of Electrical Engineering I& I I	**Semester**	1&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	123. To understand the fundamentals of electrical measurements and their significance. 124. To learn the principles and components of instrumentation systems. 125. To identify the sources of errors in electrical measurements and explore methods to reduce and correct them. 126. To familiarize students with various types of measuring instruments and their performance characteristics. 127. To develop the ability to design multi-range ammeters, voltmeters, and ohmmeters for both AC and DC circuits. 128. To study electrical bridges, their types, and applications in precise measurements. 129. To understand the operation and applications of oscilloscopes in electrical measurements. 130. To explain the concept of transducers, their types, and their roles in measurement systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. 1. Explain the fundamental concepts of electrical measurements and their importance in engineering applications. 2. 2. Describe the principles, components, and structure of electrical instrumentation systems. 3. 3. Identify and classify different sources of measurement errors and apply appropriate methods to minimize and correct them. 4. 4. Interpret the operating principles and performance characteristics of various electrical measuring instruments. 5. 5. Design multi-range ammeters, voltmeters, and ohmmeters for both AC and DC circuits. 6. 6. Analyze the operation, types, and applications of electrical bridges used for precise measurements. 7. 7. Use the oscilloscope effectively to display, measure, and interpret electrical signals. 8. 8. Explain and compare different types of transducers and their roles in measurement systems. 9. 9. Perform accurate laboratory measurements following proper procedures and safety standards.

10.	10. Document and present measurement data using appropriate engineering reporting and software tools
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – Fundamentals of Electrical Measurements.** This part introduces the foundational principles of electrical measurements, covering measurement systems, SI units, standards, calibration procedures, and the essential characteristics of measuring instruments. Students learn the concepts of accuracy, precision, sensitivity, and resolution, in addition to the various types of errors (gross, systematic, and random) and the methods used to reduce or correct them. Static and dynamic characteristics—such as linearity, hysteresis, repeatability, response, damping, and time constant—are also discussed. This section builds the theoretical foundation required for understanding analog instruments and advanced measurement techniques in later parts of the course. **Assessment Activities Integrated in This Part:** • **First homework assignment** after completing the first four lectures. • **Daily Quiz 1** at the end of the fourth lecture. • **Second homework assignment** after completing the second group of four lectures. • **Daily Quiz 2** at the end of the eighth lecture. **Allocated Hours:** • **Lectures:** 10 hours • **Discussion & Tutorials:** 5 hours • **Total:** 15 hours. **Part B – Analog Measuring Instruments** This part focuses on electromechanical instruments used for current, voltage, and resistance measurements. Topics include PMMC instruments, moving-iron and electrodynamometer types, range-extension techniques using shunts and multipliers, and the design of multi-range ammeters, voltmeters, and ohmmeters for AC and DC circuits. Additional subjects include rectifier-type voltmeters, loading effects, sensitivity considerations, and overall performance characteristics of analog instruments. This section enhances students' ability to design, analyze, and evaluate traditional measurement devices employed in laboratory and industrial applications. **Assessment Activities Integrated in This Part:** • **Third homework assignment** after completing the third set of four lectures.

	• **Daily Quiz 3** at the end of the twelfth lecture. • **Laboratory/Report assignment** related to multi-range instrument design. **Allocated Hours:** • **Lectures:** 10hours • **Discussion & Tutorials:** 5 hours • **Total:** 15 hours. **Part C – Bridges, Oscilloscope, and Transducers** This part addresses the advanced methods used in precise electrical measurements. It covers DC bridges (Wheatstone, Kelvin) and AC bridges (Maxwell, Hay, Owen, Schering, Wien) used for measuring resistance, inductance, capacitance, and frequency. Students also study the structure and operation of oscilloscopes, including block diagrams, triggering circuits, time-base systems, and techniques for measuring voltage, frequency, and phase. The section concludes with an introduction to electrical transducers—resistive, inductive, and capacitive types—and their applications in measurement and instrumentation systems. **Assessment Activities Integrated in This Part:** • **Classroom activity** assigned after completing the major lecture blocks. • **Individual technical report**, prepared by each student **based on previously covered lectures** without specifying a particular predefined topic. • **Preparation for the midterm and final examinations**. **Allocated Hours:** • **Lectures:** 10 hours • **Discussion & Tutorials:** 5 hours. • **Final exam:** 3 hours. • **Total:** 18 hours
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1.**Interactive Lecturing:** Utilize dialogue-based lectures to introduce and clarify core concepts in measurements, instruments, and bridge circuits, encouraging active student participation. 2.**Conceptual Visualization:** Employ diagrams, schematic representations, real instrument models, and multimedia demonstrations to illustrate operating principles and static/dynamic characteristics.

	3.**Problem-Based Learning (PBL):** Dedicate the weekly discussion hour to solving application-oriented problems related to measurement errors, instrument design, and bridge analysis. 4.**Incremental Assessment:** Implement staged learning through three homework assignments and three daily quizzes aligned with every block of four lectures to reinforce progressive understanding. 5.**Hands-On Demonstration:** Integrate practical demonstrations and lab-style examples to explain electromechanical instruments, multi-range designs, and oscilloscope measurements. 6.**Collaborative Learning:** Use small-group activities (Think–Pair–Share) to analyze measurement errors, interpret signals, troubleshoot circuits, and discuss alternative design approaches. 7.**Project-Based Reporting:** Assign each student an individual technical report based on previously covered lectures, enhancing research skills, critical analysis, and the ability to synthesize theoretical knowledge with practical applications. 8.**Classroom Active Tasks:** Include targeted in-class activities following major lecture blocks to strengthen analytical reasoning and applied problem-solving skills. 9.**Case Studies and Real-World Applications:** Connect theoretical content with industrial and laboratory applications, such as bridge measurement systems, oscilloscope troubleshooting, and sensor integration. 10.**Structured Exam Preparation:** Provide organized review sessions for both the midterm and final exams, focusing on problem-solving strategies, conceptual understanding, and interpretation of measurement results.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
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	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem)	100		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Weeks	Material Covered
Week 1	Introduction to electrical measurements and instrumentation systems
Week 2	Classification and characteristics of measuring instruments
Week 3	Units, systems of units, SI units, fundamental and derived units
Week 4	Sources of errors in electrical measurements and methods of error reduction
Week 5	Electromechanical measuring instruments: construction, operation, and torque types

Week 6	Design and analysis of multi-range ammeters, voltmeters, and ohmmeters
Week 7	Design and analysis of multi-range voltmeters.
Week 8	Design and analysis of multi-range ohmmeters
Week 9	Rectifier-type voltmeters and practical examples
Week 10	Oscilloscopes: principles and applications
Week 11	Direct current (DC) bridges and their applications
Week 12	Alternating current (AC) bridges and their applications
Week 13	Introduction to transducers: classification and types
Week 14	Resistance, inductive transducers
Week 15	capacitive transducers
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1.Cooper, Electronic Instrumentation and Measurement Technology (Latest Edition).	Yes
Recommended Texts	1.U. A. Bakashi, Electronic Measurement Systems, 2008 2. A. K. Sawhney, Electrical Measurements and Measuring Instruments, 2008. 3.Ahmed A. Montaser, Electrical and Electronic Measurements, 1999. 4.Dr. Muzafar Al-Nu'ma and Dr. Sinan Attar Bashi, Electrical Measurements, University of Mosul Press, 1988.	Yes
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electrical Engineering Lab. II** مختبرات الهندسة الكهربائية II			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC213**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level	UGx11 2		**Semester of Delivery**	3	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Dr. Ahmed Salim Jarallah		**e-mail**	Ahmed.salim@uomosul.equ.iq	
Peer Reviewer Name	اسم مُراجع الملف		**e-mail**	بريده الالكتروني	
Scientific Committee Approval Date	28/01/2026		**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	This course deals with general and different topics in the fields of electronic and power within the framework of the student's curriculum and includes practical experiences in studying the characteristics of the diode and its applications and the types of connection of the transistor and its advantages. This course also covers the study of transient conditions in electrical circuits and transformer tests and DC machines
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course designed to develop the students' abilities about using the different measurement equipment's that necessary to execute the practical experiments. Also this course covered the need of students to investigate the theoretical subjects according to practical method that's will improve the scientific level of students through this course By the end of this course, student should be able to: • Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). • Ability to analyze electrical circuits and understand the nature of their work(ii). • Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). • Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). • Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v).
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Circuit Components and values DC circuits, Current and voltage definitions, Passive sign convention and circuit elements, Resistive networks, real and ideal elements, voltage and current sources. [9 hrs.] Lab. [6 hrs.]

	Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] Part B- Circuit reduction combining sources, Combining resistive elements in series and parallel, delta and star transformation. [12 hrs.] Revision problem and tutorial classes [8 hrs.] Lab. [8 hrs.] Quizzes [1 hr.] Part C- Circuit Theory Kirchhoff's laws and Ohm's law. Introduction to mesh and nodal analysis, Introduction to thevenin and Norton theory, maximum power transfer, introduction to superposition theory. [24 hrs.] Revision problem and tutorial classes [16 hrs.]

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

Student Workload (SWL) الحمل الدراشي 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)	42	**Unstructured SWL (h/w)**	3

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	0	0%(0)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	2	25% (25)	Continuous	All
	Report	10	10% (10)	---	---
Summative assessment	Midterm Exam	2Hr	10% (10)	7	LO # 1-5
	Final Exam	3Hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Lab 1: Introduction to lab. components
Week 2	Lab 2: Study of common base transistor characteristic
Week 3	Lab 3: Common emitter transistor as an amplifier
Week 4	Lab 4: Common Collector transistor as an amplifier
Week 5	Lab 5: Low bass filter
Week 6	Lab 6: band bass filter

Week 7	Lab 7: high bass filter
Week 8	Lab 8: Transistor as a switch & device drive
Week 9	Lab 9: Mid-term exam
Week 10	Lab 10: Digital logics
Week 11	Lab 11: Digital Circuits
Week 12	Lab 12: Study of JFET Transistor characteristics
Week 13	Lab 13: Negative feedback connection
Week 14	Lab 14: Speed control for DC motor
Week 15	Lab 15: preparatory week before the Final exam and review
Week 16	Lab 16 : Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Electrical technology (twenty-third edition) BL.THERAJA,AK. THERAJA S. Chand and company Ltd. (2005), ISBN: 81-219-2440-5. • Electronics devices (Ninth edition) by Thomas L. Floyd (2012), Prentice Hall ISBN-13: 978-0-13-254986-8.	Yes

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 works 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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**English Language 2** اللغة الانكليزية 2	**Module Delivery**	
Module Type	**Basic learning activities**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**UOM2022**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	Two	**Semester of Delivery**	Four
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Dr. Omer S. Yehia	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Doctor
Module Tutor	Dr. Farhad E. Mahmood	**e-mail**	Farhad.m@uomosul.edu.iq
Peer Reviewer Name	Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq
Scientific Committee Approval Date	10/06/2023	**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 and Learning Outcomes	Students will be able to: 1. Distinguish between dependent, Independent, and Integrated essays. 2. Find the topic and the thesis statement of short essays. 3. Identify the main ideas from the introduction paragraph. 4. Identify the main ideas from the body paragraph. 5. Find the supporting details from the introduction paragraph. 6. Find the supporting details from the body paragraph. 7. Draw an outline to link the ideas, supporting details, and essay topic. 8. Make notes in response to an essay question to create main ideas, supporting details, and thesis statement. 9. Write the introduction paragraph on basis of the thesis statement and main ideas. 10. Build the body paragraphs based on main ideas and supporting details. 11. Write the introduction paragraph based on the main ideas. 12. Enhance the smoothness and fluency of an essay by employing transition words and sentence starters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Classification of Essays:** [2 hrs] - Independent essays based on personal thoughts. - Dependent essays based on data, figures, diagrams. - Integrated essays **Structure of academic essays:** [6 hrs] - Analyzing academic essays according to the standard structure of academic essays. **Idea Maps:** [3 hrs] - Filling the idea maps from the major information extracted while reading an essay. **Responding to an essay question:** [4 hrs] - Building an outline using personal ideas in response to an essay question. **Writing Paragraphs:** [6 hrs] - Writing thesis statement. - The Introduction Paragraph. - The Body Paragraphs. **Essay Conclusion:** [3 hrs] - Writing the conclusion paragraph considering the main ideas stated in the introduction and body paragraphs **Transition words and connection phrases:** [3 hrs] **Dependent essays:** [3hrs]

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

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

Student Workload (SWL) الحمل الدراشي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

As		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	4,8,12	LO #1- 12
	Assignments	3	12% (12)	2 to 12	LO #1, 9, and 10
	Report	1	8% (8)	---	----
	In class Assignmint	1	5%(5)		
Summative assessment	Midterm Exam	2 hr	10% (10)	8	LO # 1-2
	Final Exam	3 hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

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

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ NEW HEADWAY INTERMEDIATE	
Recommended Texts	ENGLISH GRAMMAR IN USE	No

Websites	

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer 2** **الحاسوب 2**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UOM2032**				
ECTS Credits	**3**				
SWL (hr./sem)	**75**				
Module Level		2	**Semester of Delivery**		4
Administering Department		**Department of Electrical Engineering**	**College**	**College of Engineering**	
Module Leader	Omar Sharaf Deen		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		**Assistant Proff.**	**Module Leader's Qualification**		**PhD**
Module Tutor	**OMAR KANAAN TAHA**		**e-mail**	omar.alsultan@uomosul.edu.iq	
Peer Reviewer Name		Dr. Ahmad Salam	**e-mail**	ahmed.salim@uomosul.edu.iq	
Scientific Committee Approval Date		28/1/2026	**Version Number**		1.1

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 Module aim is to prepare student to deal with computers. In addition to, teach the student the fundamentals of computers and its components. Furthermore, learning how to use two of Microsoft Office applications (Word and Excel).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students successfully completing this course will be able to: 1. Identify and discuss the hardware components of the computer system.(V) 2. Create documents using a word processor and create presentations. (V) 3. Conduct research on the Internet. (V) 4. Gain an introduction to Artificial Intelligence. (V)
Indicative Contents المحتويات الإرشادية	**Security and Networking** [4 hr] **E-Commerce** [4 hr] **Computer Troubleshooting**[8 hr] **Introduction to AI**[8 hr] **AI in Our Daily**[8 hr] **Applications of AI**[12 hr] **AI and Society**[4 hr] **Ethical Challenges in AI**[4 hr] **The Future of AI**[4 hr]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The basic strategy for delivering this module will focus on encouraging students'

	engagement in practical activities while simultaneously enhancing and expanding their critical thinking skills. This will be achieved by combining lectures, laboratory sessions and engaging students in external research on topics in computer technology that interest them.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (5)	4, 11	LO #Q1: 1-4, Q2: 5
	Assignments	2	10% (5)	3, 10	LO #A1: 1-4, A2: 5
	Projects / Lab.	1	10% (10)	14	All
	Report	1	10% (10)	13	All
Summative assessment	**Midterm Exam**	2 hr	10% (10)	9	LO # 1-4
	Final Exam	3hr	50% (50)		All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	**Security and Networking:** What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	**E-Commerce:** Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking.
Week 3	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 4	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 6	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 8	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 9	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 10	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 11	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	**AI and Society:** (How AI affects social, AI and international relations, AI and the future of humanity.)
Week 13	**Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of AI on the job market.)**

Week 14	**The Future of AI : (Future trends in AI, recent research and emerging technologies.)**
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly lab. Syllabus) المنهاج الاسبوعي العملي	
Week	**Material Covered**
Week 1	**Security and Networking:** What is a network? Types of networks. Basic network components. Network Security Basics. Understanding network threats. Network Troubleshooting
Week 2	**E-Commerce:** Concepts of Electronic banking services this include online banking: ATM and debit card services, Phone banking, SMS banking, electronic alert, Mobile banking.
Week 3	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 4	**Computer Troubleshooting:** Identifying and solving common hardware and software problems that computer users encounter, Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 5	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 6	**Introduction to AI:** Definition of AI, History of AI, AI Techniques and Approaches, Challenges and Ethical Considerations.
Week 7	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 8	**AI in Our Daily Lives:** AI in smartphones and virtual assistants like Siri or Google Assistant.)
Week 9	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 10	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 11	**Applications of AI:** Education, Healthcare, Finance, Transportation, Marketing and Advertising.
Week 12	**AI and Society:** (How AI affects social, AI and international relations, AI and the future of humanity.)
Week 13	**Ethical Challenges in AI: (AI ethics, privacy and surveillance, the impact of AI on the job market.)**
Week 14	**The Future of AI : (Future trends in AI, recent research and emerging technologies.)**

Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1. Graham Brown, David Watson, "Cambridge IGCSE Information and Communication Technology", 3rd Edition (2020)	no
Recommended Texts	2. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action Complete",16th Edition (2020). 3. Ahmed Banafa, "Introduction to Artificial Intelligence (AI)", 1st Edition (2024). 4 2016 الخضر على الخضر بحاث " أساسيات الحاسوب 5 2005 " الدكتور عادل عبد النور, "مدخل إلى عالم الذكاء الاصطناعي	no

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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**Mathematical Analysis** **التحليلات الرياضية**		**Module Delivery**	
Module Type	**B**		☒ **Theory**	
Module Code	**EEEC301**		☒ ☐ **Lecture**	
ECTS Credits	**4**		**Lab**	
SWL (hr./sem)	**100**		☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 3	**Semester of Delivery**	5	
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky	**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	استاذ مساعد	**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry	**e-mail**	riyadhzaki@uomosul.edu.iq	
Peer Reviewer Name	د. محمد ناطق عبدالقادر Mohamad N. Abdul Kadir	**e-mail**	makadr@uomosul.edu.iq	
Scientific Committee Approval Date	01/06/2026	**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	On successful completion of this subject, students must be able: • To understand the concepts of z transform and to solve the difference equations. • Teaching student, the basic principles of function of complex variables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Discrete time system analysis Z-transforms Inverse Z-transform Difference equations Series solution of differential equation. Power series Frobenious method Bessel differential equation Solutions of Bessel's Equation Applications of Bessel's Equation, functions of complex variables, ; Analytic functions integrations.
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.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.47
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	3	12% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects / Lab.	0	0% (25)		
	On-site assignment	1	5%(5)	12	All
	Report	1	8% (8)	14-	All

Summative assessment	**Midterm Exam**	1	10% (10)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Discrete time system analysis , Z transform; sampling
Week 2	Region of convergence
Week 3	properties of z transform
Week 4	properties of z transform
Week 5	Inverse Z transform
Week 6	Convolution
Week 7	Difference equations
Week 8	Mid-term Exam
Week 9	Inverse Z transform
Week 10	Series solution of differential equation
Week 11	Power series Frobenious method
Week 12	Bessel differential equation
Week 13	Solutions of Bessel's Equation Applications of Bessel's Equation
Week 14	Functions of complex variables.
Week 15	functions of complex variables, ; Analytic functions integrations
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011.	Yes
Recommended Texts	Advanced Engineering Mathematics Cengage Learning, Seventh Edition., 2007.	Yes
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.

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Electronics I** **الكترونيات I**		**Module Delivery**	
Module Type	**Core (C)**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC 302**			
ECTS Credits	**6**			
SWL (hr./sem)	**150**			
Module Level	UGx11 3	**Semester of Delivery**	Five	
Administering Department	Electrical Engineering	**College**	University of Mosul / College if Engineering	
Module Leader	Asst. Prof. Dr. Omer Sh. Yahya	**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Doctor	
Module Tutor	Asst. Prof. Dr. Shamil Hamzah Hussein	**e-mail**	Shamil_alnajjar84@uomosul.edu.iq	
Peer Reviewer Name	Asst. Prof. Dr. Omer Sh. Yahya	**e-mail**	o.yehya@uomosul.edu.iq	
Scientific Committee Approval Date	01/02/2026	**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	131. To develop problem solving skills of electronic circuit through the understanding solid state for each electronic passive and active elements such as operational amplifiers and its types. 132. To understand Basic Differential Amplifier and its applications. 133. This course deals with the basic concept of the Frequency Response of the amplifier as a single stage and multistage Amplifiers. 134. To understand the application of the amplifiers such as integrator, summer. 135. To understand the A/D convertor and D/A convertor circuits. 136. To perform frequency Response of the Amplifiers using BJT and FET transistor. 137. To Describe and operation of Logarithmic amplifier Analog computer circuit.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	131. Recognize the types of the operational amplifiers and frequency response of the amplifiers. 132. List the various terms associated with all active electronics devices. 133. Summarize what is meant by an active electronic device such as operational amplifiers, Differential Amplifier, and Logarithmic amplifier. 134. Describe the types of the Amplifier (integrator, summer, differentiator, …). 135. Discuss the various properties of Differential Amplifier and its applications. 136. Explain the analog computer circuits. 137. Explain the operation of the A/D convertor and D/A convertor circuits.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	**Part A - Frequency Response of the Amplifiers** Frequency Response of single stage and Multistage Amplifiers used as a BJT transistors and FET. Differential Amplifier, and Differential Amplifier Applications. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part B- Operational amplifiers and its types** Operational amplifiers and its types, Operation amplifier internal circuits, Inverting amplifiers non-inverting amplifiers, Differentiator and integrator circuits. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 hr**.] **Part C- A/D and D/A convertor circuit and active filter design** A/D convertor and D/A convertor. Logarithmic amplifier. Analog computer circuit. Passive filter design. Active filter design and its applications. [**15 hrs**.] Revision problem and tutorial classes [**5 hrs**.] Quizzes [**1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	87	**Unstructured SWL (h/w)**	6

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

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	5% (15)	4,8,14	LO #1, 4, 6 and 7
	Assignments	3	4% (12)	2 to 13	LO #1, 2, 3, 4, 5 and 7
	Projects	0	0 (0)	----	-----
	Report	1	8% (8)	Continuous	All
	Classwork	1	5% (5)		
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 4-7
	Final Exam	3hr	50% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Frequency Response of the single stage amplifier using BJT transistors.
Week 2	Frequency Response of the single stage amplifier using FET transistors.
Week 3	Frequency Response of Multistage Amplifiers using BJT transistors.
Week 4	Frequency Response of Multistage Amplifiers using FET transistors.

Week 5	Basics of Operational amplifiers.
Week 6	Operational amplifiers and its types.
Week 7	Operational amplifiers and its applications.
Week 8	Characteristics of the Operational amplifiers.
Week 9	Basics of the Differential Amplifier.
Week 10	Differential Amplifier Applications.
Week 11	A/D convertor circuit and its types and applications.
Week 12	D/A convertor circuit and its types and applications.
Week 13	Passive filter and active filter design.
Week 14	Linear Power amplifiers.
Week 15	Power amplifiers applications
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Floyd, Thomas L. Electronics Fundamentals: Circuits, Devices and Applications (Floyd Electronics Fundamentals Series). Prentice-Hall, Inc., 2006.	Yes
Recommended Texts	Donald A. Neamen. (2003). "SEMICONDUCTOR PHYSICS AND DEVICES". 3rd Edition, ISBN 0-07-232107-05, USA. (can be downloaded from the Course web page/classroom).	Yes
Websites	Nashelsky, L., & Boylestad, R. L. (2021). Electronic Devices and Circuit Theory Eleventh 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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microprocessor** معالجات دقيقة			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC303**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		UGx11 3	**Semester of Delivery**		5
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		أستاذ مساعد	**Module Leader's Qualification**		دكتوراه
Module Tutor	Yazen Subhi Sheet		**e-mail**	Yazenalnuaimi@uomosul.edu.iq	
Peer Reviewer Name		Dr. Mohammed Obaid	**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date		1/09/2025	**Version Number**		1.1

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	138. To develop problem solving skills and understanding of microprocessor technology. 139. To understand computer architecture. 140. Understanding the basic of programing and data processing. 141. Understanding the basic of algorithms and flow charts. 142. Understanding the process timing diagram. 143. Digital circuit design and timing analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	138. Binary numbers manipulation. 139. Interface Microprocessor and peripheral devices. 140. Having the basics of Hardware description language (HDL). 141. Having the skills of Hardware design and software programing. 142. Microcontroller Programing.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A- Architecture of INTEL 8086** (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes [12 hrs.] problem and tutorial classes [8 hr.]. Quizzes [1 hr.] **Part B- 8086 microprocessor instruction Set** Instruction Set of 8086: Addressing Modes: Instruction format: Discussion on instruction Set: Groups: data transfer, arithmetic, logic string, branch control transfer, processor control. Interrupts: Hardware and software interrupts, responses, and types. [12 hrs.] Revision problem and tutorial classes [16 hrs.]

	Quizzes [1 hr.] **Part C – combinational, sequential digital circuit and microprocessor** Sequential and combinational circuits which are the most widely used ones in the arena of digital electronics [8 hr.]. Central Processing Unit, memory and input/output interfacing. Memory Classification Volatile and non-volatile memory, Primary and secondary memory, Static and Dynamic memory, Logical, Virtual and Physical memory [12 hrs.]. problem and tutorial classes [8 hr.]. Quizzes [1 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, video animation, and reports that are interesting to the students.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	10% (10)	4,8,12	LO #1, 5, 8 and 9
	Assignments	3	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Projects	1	5% (5)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	Midterm Exam	2 hr	30% (30)	7	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Flow charts and algorithms
Week 2	Architecture of INTEL 8086 (Bus Interface Unit, Execution unit), register organization, memory addressing, memory segmentation, Operating Modes
Week 3	Explain the instruction execution steps. Show advantage of the instruction pipelining.
Week 4	8086 Microprocessor Instruction format
Week 5	8086 microprocessor instruction Set

Week 6	Shift-and-Add Multiplication algorithm
Week 7	Next step in assembly language programming (timing)
Week 8	THE MEMORY UNIT
Week 9	Types of memory
Week 10	Distinguish different types of the microcomputer buses. Explain operation of the USB bus.
Week 11	Learn architecture of multicore processor. List the components of CPU.
Week 12	Compare the RISC processor with the CISC processor.
Week 13	Understanding combinational and sequential digital circuit
Week 14	Design of simple security system
Week 15	Logical circuit design using Vivado IDE software
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Ahmet Bindal "Fundamentals of Computer Architecture and Design" 2nd edition: © Springer Nature Switzerland AG 2019 2- Ata Elahi "Computer Systems Digital Design, Fundamentals of Computer Architecture and Assembly Language", © Springer International Publishing AG 2018 3- K M Bhurchandi "Advanced microprocessors and peripherals" © McGraw hill 2013	Yes
Recommended Texts	• K M Bhurchandi "Advanced microprocessors and peripherals" © McGraw hill 2013	Yes

	• Ahmet Bindal “Fundamentals of Computer Architecture and Design” 2nd edition: © Springer Nature Switzerland AG 2019	
Websites	https://youtu.be/gsb2QTESSFo	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Digital Communication الاتصالات الرقمية			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEEC304				
ECTS Credits	6				
SWL (hr./sem)	150				
Module Level	Three		**Semester of Delivery**	Five	
Administering Department	Electrical Engineering		**College**	College of Engineering	
Module Leader	Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof		**Module Leader's Qualification**	PhD	
Module Tutor	Dr. Abdulrhman Khalid Alhafid		**e-mail**	abdulrhman.alhafid@uomosul.edu.iq	
Peer Reviewer Name	Dr. Mohammed Obaid		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**		

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	This course is aimed to introduce fundamentals of digital communication, information theory and coding, digital transmission and reception. The goals of the course are to familiarize the students with the modeling, design and performance analysis of digital communication systems over the common physical media of wireline and wireless channels. Upon successful completion of this course the student shall be able to: • Know how to deal with random variables and signals and realize the probability theorem and the various distributions functions. • Power spectral density and autocorrelation function • Know how analog waveforms can be converted to digital waveforms with the most popular techniques (PCM) and (PTM). • Learn how to compute the spectrum for digital signals. • Examine how filtering pulse signals affects the ability of recovering the digital information at the receiver, this filtering can produce what is called (ISI). • Study how can multiplex data from several digital bit streams into one high-speed digital stream for transmission over a digital system by the mean of (TDM) and learn how to design TDM systems. • Get an overview of how to represent any binary data by many types of line coding.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Course learning objectives (student outcomes (1) through (7)). The first engineering outcome is indeed suitable for a *digital communication course*. In digital communication, engineers must understand and solve a variety of complex problems, such as signal processing, data encoding and decoding, modulation, error correction, and bandwidth optimization. Here's how the outcome aligns with the course: ✓ ***Identify***: Students need to identify key problems, like noise interference in digital signals or bandwidth limitations, that can affect communication systems. ✓ ***Formulate***: They must formulate strategies for improving data transmission quality and efficiency, such as choosing the right modulation schemes or error-correcting codes. ✓ ***Solve***: By applying engineering principles, science, and mathematics (such as Fourier analysis, probability theory, and information theory) students can develop effective solutions to enhance digital communication reliability and performance.
Indicative Contents	Fundamental concepts of digital communication systems and signal transmission. Probability theory, random variables, and random processes for communication

المحتويات الإرشادية	analysis. Autocorrelation functions and power spectral density of signals. Sampling theory and digital modulation techniques, including PAM, PCM, and PTM. Intersymbol interference, pulse shaping, and time-division multiplexing methods. Basic information theory concepts, including entropy and channel capacity.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The strategies combine theoretical clarity, practical experience, and active student engagement, ensuring that learners gain both understanding and application skills in digital communications.

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**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

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	30 min/3	15	6,9,13	1
	Assignments	30 min/1	5	11	1
	Projects / Lab.	1 Wk/1	8	7	1

	Report	1 h/3	12	6,9,13	1
Summative assessment	**Midterm Exam**	1 h/1	10	8	1
	Final Exam	3 h/1	50	16	1
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	The principles of communication systems and Introduction to digital communication systems.
Week 2	Mutually Exclusive Events Probability, Conditional Probability and Statistical Independence
Week 3	Random Variables, Cumulative Distribution Function (CDF) and Probability Density Function (PDF)
Week 4	Statistical Averages, Probability Distributions, Gaussian Distribution, Random Processes.
Week 5	Autocorrelation Correlation Function, Power Spectral Density, Convolution and Correlation, presentation activity by the students.
Week 6	Introduction to baseband pulse and digital signaling, Pulse Modulation, sampling theorem, Pulse Amplitude Modulation (PAM), Natural sampling modulator and demodulator.
Week 7	Instantaneous sampling modulator and demodulator, Pulse Code Modulation (PCM), PCM transmission system, Sampling, Quantizing and Encoding, Practical PCM Circuits, presentation activity by the students.
Week 8	Bandwidth of PCM, Effects of quantizing Noise, Example of design a PCM System, Nonuniform Quantizing: μ-Law and A-Law Companding,
Week 9	Digital Signaling and Binary Signaling, Intersymbol Interference (ISI) and Pulse Shaping.
Week 10	Time Division Multiplexing (TDM), TDM of Signals with Identical Sampling Rates, TDM of Signals with Dissimilar Sampling Rates, Asynchronous or Statistical Multiplexing.
Week 11	Multiplexing Using Sub and Super-Commutation Techniques, PCM Signals Time Division Multiplexing (PCM TDM): Synchronous systems, and Asynchronous systems.
Week 12	Pulse Time Modulation (PTM): Pulse Width Modulation (PWM), Pulse Position Modulation (PPM), Generation and Demodulation of PTM, Delta Modulation (DM).
Week 13	Adaptive Delta Modulation (ADM), binary line coding, Return-to-Zero (RZ), Non-return-to-Zero (NRZ), Polar Signaling, Unipolar (On-0ff) Signaling,
Week 14	Alternate Mark Inversion (AMI) signaling, Manchester or split-phase or Signaling, Coded Mark Inversion (CMI) Signaling.

Week 15	The Average of Information (Entropy), The Rate of information, Channel Capacity and Ideal Communication Systems
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Ferrel Stremler" Introduction to communication systems", 3rd edition. Simon. Haykin and Michael Moher, "Introduction to Analog and Digital Communications," 2nd dition, John Wiley & Sons, Inc.	
Recommended Texts	Proakis, John G. and Masoud Salehi. Digital communications., 5th edition, McGraw-hill. Leon W. Couch , "Digital and Analog Communication Systems", 5th edition. Abbas Kattoush, "Digital communications", 2nd edition, Dar Al-Manahej for Pub. & Distributing, Amman.	
Websites	Google Classroom Page: Digital Communicatioons.	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Electronics** الكترونيك رقمي			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC305**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	Three		**Semester of Delivery**	Five	
Administering Department	Electrical Eng.		**College**	Engineering	
Module Leader	Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	Doctor	
Module Tutor	Dr. Marwan Abdulkhaleq Al-yoonus		**e-mail**	marwanathy1972@uomosul.edu.iq	
Peer Reviewer Name	Dr. Mohammed Obaid		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Digital Techniques	**Semester**	Two
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 purpose of this course is to provide the students with foundation on digital circuit design, their principles and practices. Also the aimed as: - To enable students, understanding the utilization of digital logic circuit in application. - To make students aware of the various levels that is used in digital system design. - To present the concept of hardware description language in digital system design.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understanding logical circuit design concept. 2- Learn the common methods that were used to design digital system. 3- Learn the principles of hardware description language (HDL) such as Verilog HDL. 4- Knowing the important of shift registers and its applications in digital systems. 5- Understanding the important of behavioral level abstraction in digital system design. 6- Understanding the finite state machine (FSM) method in digital system design. 7- Understanding the principles of converting flow chart to logical circuit.
Indicative Contents المحتويات الإرشادية	The indicative contents of the course begin with a foundation in [Digital electronic], covering [combinational circuit] and [sequential circuit]. The course then progresses to [logical circuits timing diagram], focusing on [logical design] and [design tools]. In the latter half of the semester, students will apply these concepts to [hardware description language], culminating in a final project on [logical circuit applications].

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **Submit a paper report on a topic in the scientific subject, involving two or three students.** 2. **Offer a blackboard explanation by some students of a topic in the curriculum.**

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation تقييم المادة الدراسية				
As	**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	3	15		
	Assignments	4	12		
	Projects / Lab.	1	5		
	Report	1	8		
Summative assessment	**Midterm Exam**	1	10		
	Final Exam	1	50		
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Shift registers applications
Week 2	Digital Comparator
Week 3	Digital Multiplexer and Digital De-multiplexer
Week 4	Design of digital parity generator and checker.
Week 5	Sequence Detector
Week 6	Analog to digital converter.
Week 7	Digital to analog converter.
Week 8	Mid Term Exam
Week 9	Design Abstraction Levels
Week 10	Finite State Machine
Week 11	Field-programmable gate arrays (FPGA)
Week 12	Look up tables
Week 13	Hardware Description Languages (HDLs)
Week 14	Static time analysis
Week 15	Logical cell and interconnect delay time

Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Enoch O. Hwang "Digital Logic and Microprocessor Design with VHDL" 2005 La Sierra University, Riverside. ISBN: 0-534-46593-5 2- Brock J. LaMeres "Introduction to Logic Circuits & Logic Design with Verilog" Springer Nature Switzerland AG 2019. ISBN 978-3-030-13605-5 3- Ashish Murolia, R. K. Kanodia "Digital Electronics" By JHUNJHUNUWALA 2013. 4- Joseph Cavanagh "Digital Design Verilog HDL and Fundamentals" Santa Clara University California, USA, 2008 by Taylor and Francis Group, LLC. International Standard Book Number (ISBN): 978-1-4200-7415-4	
Recommended Texts	Enoch O. Hwang "Digital Logic and Microprocessor Design with VHDL" 2005 La Sierra University, Riverside. ISBN: 0-534-46593-5	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics and Communications Lab. I** مختبرات الالكترونيك والاتصالات ا			**Module Delivery**	
Module Type	**Core**			☐ **Theory**	
Module Code	**EEEC306**			☐ **Lecture**	
ECTS Credits	**4**			☒ **Lab**	
SWL (hr./sem)	**150**			☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Level		UGx11 3	**Semester of Delivery**		Six
Administering Department		2 - (Electrical Engineering)	**College**		UoM2 - (Engineering)
Module Leader	د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky		**e-mail**		o.yehya@uomosul.edu.iq
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		الشهادة
Module Tutor	1-Dr. Mohamad N. Abdul Kadir		**e-mail**		makadr@uomosul.edu.iq
Peer Reviewer Name		Dr Yasir Muhammed Yonus	**e-mail**		Yasir_752000@uomosul.edu.iq
Scientific Committee Approval Date		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	This course is designed as the second part of Power Electronics I (EEPM305) course. In EEPM305 the students introduced to power switching devices and phase-controlled converters. This course focuses on PWM control applied to dc-dc and dc-ac converters with emphasis on design part. 1- DC-DC and DC-AC power conversion. The operating principles, design, characteristics and application of these electronic power converter circuits are treated, with the goal of equipping the students with capability to analyze and design such power supplies. 2- Various important topologies of power converter circuits for specific types of applications are covered and analyzed. These include DC-DC converters and inverters. 3- The course also analyze the qualities of waveforms at input and output ends of these converters. The quality of these waveforms is of major concern to users of modern power converter circuits. 4- The course covers some aspects of the design and application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the completion of the course, the students should be able to: 1. Perform analysis of single- and multi-quadrant DC-DC chopper, and identify the fundamental control methods (current mode/voltage mode). 2. Analyze non-isolated DC-supply circuits: Buck, Boost, Buck-Boost and Cuk converters. 3. Perform a basic design (topology and components selection) of dc-supply circuit for a given application. 4. Describe the role of the transformer isolation and analyze the basic transformer-isolated dc-dc converters. 5. Present single-phase VSI half and full-bridges implementations. 6. Analyze the single-phase inverter operation in square-wave, quasi-square

	wave and PWM modes. 7. Define three-phase VSI, switching variables and operations as six step inverter. 8. Present carrier comparison control of three phase inverter.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Chapter 1: DC Choppers: (3 weeks)** First quadrant, second quadrant, first and second quadrants, first and fourth quadrants and four quadrants choppers. Bridge Circuit switching function **Chapter 2: non-isolated D.C power supply circuits: (4 weeks)** Buck, boost, buck-boost, and Cuk regulators. **Chapter 3: Transformer-Isolated DC supplies (2 weeks):** Feedforward and flyback. **Chapter 4: Single-phase and three-phase inverters. (6weeks)** Square wave mode (half and full bridge circuits), quasi square wave operation and PWM of single-phase inverter Three phase inverter and its switching variables Pulse width modulation (PWM) strategies of three-phase inverter.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering some activities through a simple project to guide the students to self-learning, software use, report writing and scientific debate skills.

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem)	63	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 2, 5 and 7
	Assignments	3	12% (12)	2 to 15	LO # 1, 3, and 6
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	13	ALL
	On-site assignment	1	5%(5)	11	3
Summative assessment	Midterm Exam	1	10% (10)	9	1-4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction: PWM control explanation through an idealized converter.
Week 2	One and two dc quadrant choppers: topology and analysis.

Week 3	Four-quadrant chopper: analysis; voltage and current control.
Week 4	**Non-isolated DC Power supply circuits** Buck Converter, Boost Converter
Week 5	Buck-Boost, Cuk converter
Week 6	DC power supply circuits: discontinuous mode analysis
Week 7	DC power supply circuits comparison and design aspects
Week 8	Transformer Isolated DC supply circuit. The operation and analysis of transformer in power converters
Week 9	Fly-back Converter Forward Converter
Week 10	**(Mid-term exam)** **Chapter 6: AC Inverters** Single –Phase half-bridge inverter Square wave mode
Week 11	Single –Phase full-bridge Inverter Square wave mode Single –Phase Quasi square wave mode
Week 12	Single-Phase Inverter: PWM control Implementation and analysis using Fourier series analysis
Week 13	Three –Phase VSI: Square Wave Mode (six-step inverter)
Week 14	**Session 1:** Three –Phase VSI: Sinusoidal PWM **Session 2:** Three-Phase VSI: Carrier Comparison methods
Week 15	Analysis and design of three-phase inverter.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	INTRODUCTION TO MODERN POWER ELECTRONICS (third edition) by Andrzej M. Trzynadlowski; Wiley (2016)	No
Recommended Texts	-- Power Electronics: Converters, Applications and Design; by Mohan, Undeland and Robbins 3rd Edition (Wiley) -Fundamentals of Power Electronics, by Robert W. Erickson and Dragan Maksimovi´c, Third Edition, Springer (2020).	No
Websites	https://classroom.google.com/c/NDA5MDI4MDc5MzQz	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Numerical Analysis التحليلات العددية			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC307**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level	UGx11 3		**Semester of Delivery**	6	
Administering Department	2 - (Electrical Engineering)		**College**	UoM2 - (Engineering)	
Module Leader	د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	الشهادة	
Module Tutor	Dr. Riyadh Zaki Sabry		**e-mail**	riyadhzaki @uomosul.edu.iq	
Peer Reviewer Name	د. محمد ناطق عبدالقادر Mohamad N. Abdul Kadir		**e-mail**	makadr@uomosul.edu.iq	
Scientific Committee Approval	10/06/2023		**Version Number**	1.0	

Date			

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. Solving the 2nd order differential equation and Bessel differential equations by series solutions. 2. Students learn the principals of the wave equation for one and two dimensions. 3. To introduce the fundamentals of numerical methods used for the solution of engineering problems and to improve the computer skills of the students.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Partial Differential Equations. One dimensional wave equation Separation of variables, Vibrating string, two-dimensional wave equation, transmission line, Introduction to Complex Variables Complex number system and its operations, Limits and sequences Continuous functions and their properties, Derivatives complex integration and Cauchy integral theorems. Concepts and role for the numerical method in engineering, Numerical Solution of Nonlinear Algebraic Equations, Open Methods, Numerical Solution of linear algebraic equations, Curve Fitting
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.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	100	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	92	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	15% (5)		
	Assignments	3	12% (5)		

	Projects / Lab.	0	0% (25)		
	On-site assignment	1	5%(5)		
	Report	1	8% (8)		
Summative assessment	**Midterm Exam**	1	10% (10)		
	Final Exam	3hr	50% (50)		
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Partial Differential Equations. One dimensional wave equation Laplace equation Derivatives
Week 2	Separation of variables
Week 3	vibrating string, two-dimensional wave equation, transmission line
Week 4	Introduction to Complex Variables
Week 5	Complex number system and its operations
Week 6	Limits and sequences Continuous functions and their properties
Week 7	complex integration and Cauchy integral theorems
Week 8	Mid-term Exam
Week 9	Concepts and role for the numerical method in engineering, approximations, and errors, the definition of Round-off error and truncation error, absolute and rel ative true/approximation error.
Week 10	Numerical Solution of Nonlinear Algebraic Equations (Roots of Equations): Bracketing Methods (Bisection, and False-Position method)
Week 11	Open Methods (Newton-Raphson and secant method).
Week 12	Numerical Solution of linear algebraic equations (system): the difference between the direct and indirect methods, Singular and ill/wel1-conditioned system, Parlial and complete Pivoting, Convergence Criteria, Jacobi iterative method.
Week 13	The gauss-Seidel iterative method, Gauss-Seidel iterative with the relaxation factor method. Tri-

	diagonal systems and its solution.
Week 14	Curve Fitting: Classification of Curve Fitting (Regression and Interpolation), the concepts of regression, and Least Square Criterion, Linear Regression.
Week 15	Introduction another to another methods (finite difference, finite volume, finite element method
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, Inc; 10th Ed.; 2011. Applied Numerical Methods with MATLAB for Engineers and Scientists ,Steven C. Chapra,2018	Yes
Recommended Texts	1- Numerical Analysis Using Matlab and Excel, Steven T. Karris, Third Edition, 2007.	YES
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	**FX –** Fail	راسب (قيد)	(45-49)	More work required but credit awarded

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Antennas and Wave Propagation الهوائيات وانتشار الموجات			**Module Delivery**	
Module Type	Core learning activity			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEEC309				
ECTS Credits	**5**				
SWL (hr./sem)	**125**				
Module Level		3	**Semester of Delivery**		6
Administering Department		electrical	**College**	UoM2 - (Engineering)	
Module Leader	Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	ALI GHANEM SABER		**e-mail**	Ali-alanaz@uomosul.edu.iq	
Peer Reviewer Name		Dr. Mohammed Obaid	**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date		11/06/2023	**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	In this course a fundamental parameters of antennas are studied. The characteristics of different types of antennas are described. Array antenna theory and its analysis is explained. Radio wave propagation (ground, troposphere, and ionosphere) are studied. In this course, the student will acquire the following skills: ✓ Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture). ✓ Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. ✓ Develop expressions for the radiated fields of infinitesimal and finite length dipoles.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	In this course, the student will acquire the following skills: • Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture) . • Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. • Develop expressions for the radiated fields of infinitesimal and finite length dipoles. • Discuss the effect of increasing dipole length on radiation pattern and input impedance. • Derive expressions for the radiation pattern of a linear array of identical isotropicp elements. • Discuss the principles of pattern multiplication. • Identify plane wave in both normal and oblique incidences. • Know various types of radio wave propagation (ground wave propagation, tropospheric wave propagation, ionospheric wave propagation).
Indicative Contents	Indicative content includes the following. Part A – Probability, Random Processes, and Information Theory

المحتويات الإرشادية	Define the fundamental parameters of antennas (radiation pattern, radiation power density, radiation intensity, beam width, directivity, efficiency, gain, and effective aperture). Derive expressions of radiated electric and magnetic fields using magnetic vector potentials. [21 hrs.] Revision problem and tutorial classes [7 hrs.] Quizzes [1 hr.] Part B- Sampling Theory and Digital Modulations Develop expressions for the radiated fields of infinitesimal and finite length dipoles. Discuss the effect of increasing dipole length on radiation pattern and input impedance. Derive expressions for the radiation pattern of a linear array of identical isotropic elements. [7 hrs.] Quizzes [2 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, virtual Labs, projects, seminars and by considering type of simple explanations and examples involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation

تقييم المادة الدراسية

	Time/	Weight (Marks)	Week Due	Relevant Learning

As		Number			Outcome
Formative assessment	**Quizzes**	1	10%(5)	4,6,11,15	LO #3, 4, 6 and 7
	Assignments	10	5% (5)	2 to 12	LO #1-7
	Projects / Lab.	2	10% (25)	Continuous	All
	Report	0	0% (0)	----	----
Summative assessment	**Midterm Exam**	2hr	15% (15)	7	LO # 1-5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Fundamental parameters of antenna: radiation patterns, field region, radiation power density, radiation intensity.
Week 2	Fundamental parameters of antenna: directivity, gain, HPBW, bandwidth.
Week 3	Linear wire antenna: infinitesimal dipole
Week 4	Linear wire antenna: finite length dipole
Week 5	Array antenna: array theory, two element array.
Week 6	Array antenna: broadside array, end-fire array.
Week 7	Array antenna: N- element array (uniform amplitude & uniform spacing).
Week 8	Array antenna: N- element array (scanning array)
Week 9	Array antenna: multiplication of patterns, non- uniform amplitude array.
Week 10	Broadband antennas: broadband dipole, folded dipole, microstrip antenna
Week 11	Broadband antennas: microstrip antenna
Week 12	Maxwell equations

Week 13	Rectangular waveguide
Week 14	Rectangular waveguide
Week 15	Scattering matrix(S-parameters)
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Introduction to Analog and Digital Communications 2nd edition, by Simon Haykin and Michael Moher Copyright © 2007 John Wiley & Sons, Inc.	Yes
Recommended Texts	Introduction to communication systems, 3rd edition, by Ferrel Stremle	No
Websites		

Grading Scheme

مخطط الدرجات

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

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**CONTROL SYSTEMS** نظم السيطرة			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC310**				
ECTS Credits	**6**				
SWL (hr./sem)	**150**				
Module Level		Third-Electronic and communication	**Semester of Delivery**		six
Administering Department		Department of Electrical	**College**	Engineering	
Module Leader	Dr.Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Dept.	**Module Leader's Qualification**		PhD

Module Tutor	Dr. Mohammed Obaid Mustafa	**e-mail**	mohammed.obaid@uomosul.edu.iq
Peer Reviewer Name	Dr. Mohammed Obaid Mustafa	**e-mail**	mohammed.obaid@uomosul.edu.iq
Scientific Committee Approval Date		**Version Number**	1.1

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 this course is to provide students with a solid understanding of the **analysis, modeling, and design of control systems**. The course develops the ability to analyze system behavior, assess stability and performance, and design appropriate controllers for engineering applications. 1. Develop a strong foundation in **mathematical modeling of dynamic systems** using differential equations, transfer functions, and state-space representations. 2. Enable students to analyze the **time-domain and frequency-domain behavior** of control systems, including transient and steady-state performance. 3. Provide systematic methods for assessing **stability** using classical and modern techniques. 4. Introduce PID controller design techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Model** dynamic systems using differential equations, transfer functions, and state-space representations. **Analyze** system behavior in the time and frequency domains. **Evaluate** system stability using classical and modern stability criteria.
Indicative Contents المحتويات الإرشادية	W1-W3 Introduction and concept of control systems

- Definition and classification of control systems
- Basic components of a control system
- Open-loop vs. closed-loop control systems
- Advantages and disadvantages of feedback
- Review of Laplace transform fundamentals
- Basic matrix operations
- Concept and definition of transfer functions

W4-W5 Modelling of Control Systems and Transfer function

- Block diagram representation of systems
- Feedback loop representation
- Concept of signal-flow graphs
- Conversion between block diagrams and SFGs

W6-W9 Representation of control systems as matrix form

- Concept of state variables
- State-space representation
- State equations in vector–matrix form
- Compact representation of multi-variable systems
- Input, state, and output matrices
- Examples of MIMO systems

W10-W13 Analysis of control systems

- Characteristic equation of state-space systems
- Concept and importance of controllability
- Controllability tests
- Concept and importance of observability
- Observability tests

W14-W15 Time-Domain Analysis of Control Systems

- Time response specifications
- Analysis of first-order systems
- Stability considerations
- Time-domain performance indices
- Steady-state error analysis
- Error constants
- Transient response of second-order systems

	• Damping ratio, natural frequency, overshoot, settling time

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Lectures** • Structured lectures introduce fundamental concepts, theories, and analytical techniques in control systems. • Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. **2. Problem-Solving Sessions** • Guided tutorials focus on solving numerical and analytical problems. • Students practice stability analysis, controller design, and performance evaluation. • Active student participation is encouraged through in-class discussions. **3. Project-Based Learning** • Individual or group mini-projects involve modeling, analysis, and controller design for selected systems. **4. Self-Directed Learning** • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support deeper understanding. **5. Continuous Feedback** • Regular formative feedback is provided through assignments, quizzes, and reports. • Feedback helps students identify strengths and areas for improvement.

Student Workload (SWL)

الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**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

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	15	CONTINUES	1-3
	Assignments	1/3	12	CONTINUES	1-2
	CLASSWORK	1/1	5	CONTINUES	1-3
	Report	1/1	8	CONTINUES	1-3
Summative assessment	Midterm Exam	1.5/1	10	CONTINUES	1-3
	Final Exam	3/1	50	CONTINUES	1-3
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	

	Basic Components of a Control system, open-Loop Control systems, Closed-closed Loop Control Systems, Laplace Transform, Matrix, Transfer function
Week 2	Theoretical Foundation and Background Material: Modeling of Dynamic Systems
Week 3	Introduction to Modeling of Simple Electrical Systems
Week 4	Block Diagrams
Week 5	Signal-Flow Graphs (SFGs)
Week 6	State Variable Analysis
Week 7	Vector-Matrix Representation of State Equations
Week 8	Transfer Functions, Relationship between State Equations and Transfer Function
Week 9	From Differential Equations to State Diagram
Week 10	**Exam**
Week 11	State-Transition Matrix , State-Transition Equation
Week 12	Characteristic Equations, Similarity Transformation
Week 13	Controllability and Observability of Control Systems
Week 14	Time-Domain Analysis of Control Systems
Week 15	Steady-State Error, Transient Response of a Second-Order System
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**

Required Texts	1. Automatic Control Systems, (9th Edition), By: Golnaraghi and B. C. Kuo.	
Recommended Texts	**2.** Modern Control Engineering, (5th Edition), By: Katsuhiko Ogata. 3. Control Systems Engineering, (6th Edition) By: Norman S. Nise	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Programmable controllers** متحكمات مبرمجة			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	**EEEC311**				
ECTS Credits	**2**				
SWL (hr./sem)	**50**				
Module Level		UGx11 3	**Semester of Delivery**		Six
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		الشهادة
Module Tutor	1-		**e-mail**	@uomosul.edu.iq	

Peer Reviewer Name	Fawaz Yaseen Abdullah	**e-mail**	fawaazyasen@uomosul.edu.iq
Scientific Committee Approval Date	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	An introductory course on programmable logic controllers (PLCs) and their basic applications. Topics include an overview of PLCs, PLC hardware components, basics of PLC programming, development of fundamental PLC ladder programming, timers and counters, data manipulation, concepts in analog data I/O advanced programming techniques, PLC sensors and actuators, and PLC communication Networks. Classroom instruction is supported by laboratory activities through which students use PLCs to perform industrial control functions, troubleshooting, and networking PLCs in situations of typical industrial projects
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of successful completion of this course, the student will be able to: 1. Apply modern PLC programming tools to develop functional ladder diagrams 2. Design a ladder program to control sequential processes. 3. Design a ladder program for timer and counter based systems 4. Assess communication links between computers, PLCs and various I/O devices
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Competency 1:** The student will demonstrate an understanding of the building blocks of basic Boolean algebra by: 1. Applying basic number conversation to and from different numbers systems, such as:

	binary, decimal, hexadecimal, anecdotal 2. Describing and implementing basic logical operators such as: and, or and not 3. Simplifying Boolean functions using K-Maps 4. Converting Boolean functions into digital circuits and generating the corresponding truth tables 5. Describing and implementing the one's and two's complement binary notation **Competency 2**: The student will demonstrate an understanding of basic programmable logic controller (PLC) technology and the industrial control devices used currently in automation by: 1. Defining and describing a PLC 2. Describing the functions of all the devices in a PLC system 3. Describing the differences and similarities among relay ladder logic and PLC ladder logic 4. Describing the differences between personal computers and PLCs 5. Designing and implementing basic ladder logic programs 6. Describing the electrical safety issues related to working with PLCs **Competency 3:** The student will demonstrate an understanding of the basic operation of electro-mechanical input devices by: 1. Identifying and describing various manually operated switches typically used in PLCs such as: toggle, push button, selector, and push wheel 2. Identifying and describing the following output devices: solenoids, relays, contactors, and alarms 3. Interfacing basic input/output devices to a PLC system 4. Troubleshooting basic input/output devices in a PLC system **Competency 4:** The student will demonstrate an understanding of the operation of basic electronic and mechanical timers by: 1. Describing the main differences among mechanical and electronic timing relays 2. Identifying and describing the operation of a mechanical timing relay 3. Identifying and describing the operation of timer -on delay (TON) and timer -of delay (TOF)

	timer instructions 4. Troubleshooting input/output modules with timer instructions **Competency 5**: The student will demonstrate an understanding of the operation of basic electronic and mechanical counters by: 1. Describing the main differences between mechanical and electronic counters 2. Identifying and describing the operation of a mechanical counter 3. Designing and analyzing ladder diagrams for the up/down counter typically implemented in industrial automation 4. Designing and implementing, using a PLC system, the done bit, enable bit and overflow/underflow bit counters 5. Troubleshooting counters in a ladder logic design **Competency 6**: The student will demonstrate an understanding of the operation and function of electromechanical sequencing devices by: 1. Identifying and describing the operation and function of electro-mechanical sequencing devices 2. Describing the basic PLC sequencer function 3. Designing and implementing the ladder logic diagram for the operation of a PLC sequencer with timing 4. Designing, describing and implementing the technique of cascading sequencers 5. Troubleshooting ladder logic rungs using sequencer instructions **Competency 7**: The student will demonstrate an understanding of the operation and function of analog sensors by: 1. Describing the operation and function of analog devices such as temperature, pressure, flow and position sensors 2. Enumerating and describing the components of an infrared system and their operations 3. Explaining the general closed -loop block diagram and stating the purpose of each of the blocks 4. Describing and explaining the general characteristics that differ between effective and ineffective control systems 5. Troubleshooting basic input/output analog devices
Learning and Teaching Strategies	

استراتيجيات التعلم والتعليم	
Strategies	-Active Learning: Through class discussions and real world problems. - Coordination with lab classes to provide a parallel hands-on experience. -Use google classroom platform to enhance learning and provide supplementary material.

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	15% (15)	2, 8, 12	LO# 2, 5 and 7
	Assignments	3	12% (12)	2 to 15	LO # 1, 3, and 6
	Projects / Lab.	0	0 (0)	-----	----
	Report	1	8% (8)	13	ALL
	On-site assignment	1	5%(5)	11	3
Summative assessment	Midterm Exam	1	10% (10)	9	1-4
	Final Exam	3hr	50% (50)	16	ALL
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to PLCs.
Week 2	PLC basics
Week 3	PLC Addressing.
Week 4	**Basic Ladder Logic Programming**
Week 5	Basic Instructions
Week 6	Programming word level logic instructions, Relation of digital gate logicto contact/coil logic, Relay logic, Relay Sequencers
Week 7	Programming word level logic instructions, Relation of digital gate logicto contact/coil logic, Relay logic, Relay Sequencers
Week 8	PLC Timer Functions
Week 9	ladder diagram elements. Instructions: Relay type instructions,
Week 10	**(Mid-term exam)**
Week 11	Instruction addressing, Branch Instructions,
Week 12	Internal Relay Instructions, Programming
Week 13	PLC I/O Module Types
Week 14	**PLC I/O Module Types and PLC Trainer Configuration**
Week 15	Tutorial Class Discussion.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson, 2nd Edition	No
Recommended Texts	-- John W. Webb, Ronald A. Reis, “Programmable Logic Controllers: Principles and Application”, PHI Learning, New Delhi, 5th Edition - John R. Hackworth, Frederick D., Hackworth Jr., “Programmable Logic Controllers Programming Methods and Applications”, PHI Publishers	No
Websites	https://classroom.google.com	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics and Communications Lab. II** مختبرات الالكترونيك والاتصالات II			**Module Delivery**	
Module Type	**Support**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEEC312**				
ECTS Credits	**4**				
SWL (hr./sem)	**100**				
Module Level		UGx11 3	**Semester of Delivery**		5
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	ا د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		لقبه العلمي	**Module Leader's Qualification**		الشهادة
Module Tutor	كادر المختبر		**e-mail**		
Peer Reviewer Name		فواز ياسين عبدالله	**e-mail**	fawaazyasen@uomosul.edu.iq	

Scientific Committee Approval Date	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	1- To handle laboratory equipment and electrical elements professionally and scientifically. 2- To analyze electrical circuits and comprehend their operational principles. 3- To cultivate a scientific mindset in the student by interpreting practical results based on theoretical concepts. 4- To enhance the student's capability to design basic electronic circuits in accordance with their scientific aptitude. 5- To analyze and simulate circuit processes using various software tools on electronic calculators and compare the analysis results with practical outcomes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	143. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 144. Ability to analyze electrical circuits and understand the nature of their work(ii). 145. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 146. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 147. Analyze and simulate the process circuit using different software on the electronic calculator and match the results of the analysis with the practical results(v
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Part A - Circuit Components and values Digital Counter, Amplitude Modulation and Demodulation , Analysis of FM , 8086 Study of Finite Length Dipole Antenna , PCM , Design of a timer using the IC-555 , No load test of D.C. shunt generator , Digital –To- Analog Converters , Voltage regulators No load test of D.C. shunt generator and Speed and Direction Control of D.C shunt Motor using voltage control [10hrs.] Quizzes [1 hr.] Part B- Circuit reductionClass A Power Amplifier and Phase Splitter, Push-Pull & Complementary Power Amplifiers (Class AB power amplifier), Transmission line characteristics (Coaxial Cable), Three Phase Power Measurements, Speed and Direction Control of D.C shunt Motor using voltage control method and Encoder& Decoder. [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students

Student Workload (SWL) الحمل الدراشي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem)	100		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4,8	All
	Report	10	10% (10)	1 to 15	All
	Practical Exam	1	20%(20)	8,15	All
Summative assessment	Theoretical Exam	1	10% (10)	7	All
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	Thyristor Controllable Rectification Circuit
Week 2	The triac light dimmer control circuit
Week 3	shift register
Week 4	Class A amplefier
Week 5	Analysis of FM.
Week 6	8086
Week 7	**Study of Finite Length Dipole Antenna**
Week 8	**PCM**
Week 9	**review**
Week 10	**No load test of D.C. shunt generator**

Week 11	**Digital –To- Analog Converters**
Week 12	**Voltage regulators**
Week 13	**No load test of D.C. shunt generator**
Week 14	**Speed and Direction Control of D.C shunt Motor using voltage control**
Week 15	8086 application

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronics and Communications LABORATORY MANUAL, BY Lab . staff	YES
Recommended Texts	1- P. C. Sen, "Principles of Electrical machines and power electronics", 2nd edition, John Wiley & Sons. 2- Robert L. Boylestad , Louis Nashelsky Electronic Devices and Circuit Theory 10th Edition 3-	No
Websites		

Grading Scheme

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

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**Engineering Project Design & Planning** تصميم وتخطيط المشروع الهندسي	**Module Delivery**	
Module Type	**C**	☒ **Theory**	
Module Code	**EEEC313**	☐ **Lecture**	
ECTS Credits	**2**	☒ **Lab**	
SWL (hr./sem)	**50**	☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	3	**Semester of Delivery**	6

Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	د. عمر شرف الدين يحيى Dr. Omar Sh. Alyozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	استاذ مساعد	**Module Leader's Qualification**	الشهادة
Module Tutor		**e-mail**	
Peer Reviewer Name	د. محمد ناطق عبدالقادر Mohamad N. Abdul Kadir	**e-mail**	makadr@uomosul.edu.iq
Scientific Committee Approval Date		**Version Number**	

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 student should be able to: 1. Select a realistic engineering project idea that serves their field of specialization. 2. Formulate the project problem, objectives, and outcomes in a scientific manner. 3. Prepare a preliminary design or an initial simulation model to verify the feasibility of the idea. 4. Learn how to use certain laboratory equipment and how to handle or operate it properly. 5. Prepare a work plan (timeline and implementation plan) that leads to the completion of the engineering project. 6. Write a project proposal and deliver a preliminary presentation.
Module Learning Outcomes	After completing the course, the student will be able to: 1. Formulate a well-structured proposal for the graduation project.

مخرجات التعلم للمادة الدراسية	2. Select appropriate simulation/design tools according to the specialization. 3. Create a system block diagram, circuit diagram, or flowchart. 4. Interpret preliminary simulation results and identify the required improvements. 5. Prepare a timeline and organize the tasks of the project team. 6. Write a concise engineering report and deliver a clear presentation.
Indicative Contents المحتويات الإرشادية	**First: Theoretical Component** 1. The concept of the graduation project, its specifications, and success criteria. 2. Selecting a project idea and linking it to the needs of society and/or industry. 3. Formulating the Problem Statement, Objectives, and Scope. 4. Collecting scientific sources and managing references (IEEE style). 5. Fundamentals of the Engineering Design Process. 6. Requirements and constraints analysis (cost, time, availability of components, safety). 7. Comparing solutions and selecting the optimal alternative (Decision Matrix). 8. Introduction to modeling and simulation for electrical engineering projects. 9. Preparing an implementation plan (WBS + Gantt chart) through a Work Breakdown Structure by dividing the project into smaller parts (main tasks and sub-tasks) to make execution clear and manageable. 10. Writing the project proposal and a concise technical report. 11. Principles of testing and verification (Test Plan). 12. Overview of research ethics (citation, originality, plagiarism). 13. Introduction to fundamental international standards in electrical engineering (IEC, IEEE, ISO, NFPA, ANSI, BS) and their impact on safety and design/execution quality. **Second: Practical Component** 1. Selecting a practical applied or computer-based project for each group (2–4 students). 2. Preparing a concise proposal. 3. Conducting a preliminary literature review (12–15 references). 4. Developing an initial simulation model (according to the specialization). 5. Identifying the tools and components required for the project. 6. Preparing a timeline with milestones, delivering a progress presentation, and a preliminary final presentation for the graduation project.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive lectures 2. Group mentoring and guidance sessions 3. Simulation, design, and hands-on laboratory sessions 4. Project-Based Learning (PBL) 5. Short weekly discussions and presentations

Student Workload (SWL) الحمل الدراشي 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	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.13
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	12% (4)	3,7,11	1, 3, 4
	Assignments	2	4 %(2)	4,12	2,5
	Projects / Lab.	5	20% (4)	2-12	All
	On-site assignment	1	4%(4)	9	All

	Report				
Summative assessment	**Midterm Exam**	1	10%	10	1-5
	Final Exam	1	50%	16	All
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to the Engineering Project: concept of a project, types of engineering projects, project life cycle, and the role of the electrical engineer.
Week 2	Defining the project idea and formulating the engineering problem (Problem Definition) and analyzing technical requirements.
Week 3	Engineering solution generation (Concept Generation) and comparison of alternatives using engineering and economic criteria.
Week 4	Engineering Design Process and its application to electrical engineering projects.
Week 5	Preparing the Project Proposal: objectives, scope, deliverables, and constraints.
Week 6	Project planning: Work Breakdown Structure (WBS) and defining activities and tasks.
Week 7	Project scheduling: Gantt charts, networks (PERT/CPM), and time estimation.
Week 8	Resource and cost management: cost estimation, budgeting, and human/technical resources.
Week 9	Risk management in engineering projects: risk identification, analysis, and mitigation strategies.
Week 10	Technical considerations in electrical projects: standards (IEC, IEEE), safety, reliability, and sustainability.
Week 11	Quality management and engineering documentation: technical reports, drawings, and specifications.
Week 12	Teamwork and engineering communication: team management, presentations, and engineering ethics.
Week 13	Project implementation and monitoring: progress tracking, change control, and performance evaluation.
Week 14	Project presentations and final evaluation: discussion of results, lessons learned, and future improvements.
Week 15	Introduction to the Engineering Project: concept of a project, types of engineering projects, project life

	cycle, and the role of the electrical engineer.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Hugh Jack, Engineering Design, Planning, and Management, 2nd Edition, 2021. (Elsevier Shop(	
Recommended Texts	1. Christopher S. Coulston & Ralph M. Ford, Design for Electrical and Computer Engineers, 2024. (open.umn.edu) 2. Graeme Dandy, David Walker & Trevor Daniell, Planning and Design of Engineering Systems, 2018. (Routledge) 3. C. Lessard, Project Management for Engineering Design. (Springer Link) 4. Engineering Capstone Design: Project Planning, Organizing, and Executing. (Wiley) 5. Project Management, Planning and Control. (drnishikantjha.com) 6. الحسن أمين، الحسين علام، الدليل المتكامل لتخطيط وإدارة المشروعات، 2022. (مدني ستور) 7. عبد الله ذيب قنديل، إضاءات على علم إدارة المشاريع الهندسية من التصميم إلى التنفيذ، 2020. (Google Books) 8. Garold D. Oberlender, Project Management for Engineering and Construction. (tempo.io) 9. Project Management Institute (PMI), PMBOK® Guide. (cciedump.spoto.net)	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	English language 3 اللغة الانكليزية 3	**Module Delivery**
Module Type	Support or related learning activity	☒ **Theory**
Module Code	EEEC314	☐ **Lecture**
ECTS Credits	2	☐ **Lab**
SWL (hr./sem)	50	☐ **Tutorial**

			☐ Practical		
Module Level	3		**Semester of Delivery**	☐ Seminar	Six
Administering Department	Electrical Engineering		**College**	Engineering	
Module Leader	Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof		**Module Leader's Qualification**	PHD	
Module Tutor	Farhad Ezzulddin Mahmood		**e-mail**	Farhad.m@uomosul.edu.iq	
Peer Reviewer Name	Dr. Mohammed Obaid		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	V1	

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	• Develop technical communication skills for labs, projects, and engineering teamwork. • Produce clear technical documents using standard report structure and formatting. • Communicate data and results accurately in writing and speech. • Strengthen critical reading of technical documents and specifications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Write structured lab reports and short technical reports with correct formatting. 2. Describe methods, results, and figures using accurate technical language. 3. Prepare project documents: objectives, scope, timeline, and limitations. 4. Deliver a technical presentation (4-6 minutes) and respond to questions professionally.

	5. Perform peer review using a rubric and improve drafts based on feedback. 6. Read technical documents and extract key requirements/specifications.
Indicative Contents المحتويات الإرشادية	• Technical style: clarity, concision, and appropriate voice (active/passive). • Lab report components: Aim, Method, Results, Discussion, Conclusion. • Figures/tables: captions, referencing, and describing trends. • Project documents: proposal, progress report, and meeting minutes. • Professional writing: memos, emails, and short documentation. • Presentation and poster language; Q&A techniques. • Peer review and revision cycles.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Project-based tasks, lab-report simulations, peer review workshops, presentation rehearsals, and instructor feedback on drafts.

Student Workload (SWL) الحمل الدراشي 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	2.2
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	3.3		

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	3	30%	4,6,9	LO1-LO2
	Assignments	2	10%	6, 11	LO1-LO3
	Projects / Lab.		0%		
	Report	1	10%	7	LO1-LO3
Summative assessment	Midterm Exam	1	10%	8	LO1-LO2
	Final Exam	1	50%	Final exam	LO1-LO6
Total assessment			100%	-	LO1-LO6

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Technical writing principles; diagnostic and course orientation.
Week 2	Lab report structure; sample report analysis.
Week 3	Methods/results language; describing procedures.
Week 4	Figures/tables language; Quiz.
Week 5	Lab report drafting workshop.

Week 6	Lab report submission + Assignment 1 feedback.
Week 7	Project proposal and progress report components; Report due.
Week 8	Midterm exam + feedback plan.
Week 9	Meeting minutes; requirements/specifications reading.
Week 10	Professional emails/memos; documentation clarity.
Week 11	Project document workshop + Assignment 2.
Week 12	Presentation skills + slide language and design rules.
Week 13	Student technical presentations + Q&A.
Week 14	Peer review and revision workshop.
Week 15	Comprehensive revision + sample final questions.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Alley, The Craft of Scientific Writing (selected chapters) + instructor templates for reports.	Yes / Online
Recommended Texts	Cambridge English for Engineering (advanced units). Selected technical manuals/spec sheets.	Online
Websites	Yes (online)	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Satellite Communications** **اتصالات الاقمار الصناعية**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	**EEC 413**	
Number of Credit Hours	**4/3**	

(Total) / Number of Units (Total)			☒ **Tutorial** ☐ **Practical**		
Module Level		UGx11 4	**Semester of Delivery**	☐ **Seminar**	7
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	Dr. Saad Ahmed Ayoob		**e-mail**	sa_ah_ay@uomosul.edu.iq	
Peer Reviewer Name		Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date		01/09/2023	**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	144. To provide an understanding of the principles and technologies behind satellite communications. 145. To teach the basics of satellite orbits and link budgets for satellite communications systems. 146. To provide an awareness of the various segments of a satellite communications system, including transponders and tracking, telemetry, command, and monitoring (TT&C). 147. To develop an understanding of signal propagation through the atmosphere, including ionospheric effects and rain attenuation.

	148. To teach the different types of satellite access technologies, such as FDMA, TDMA, CDMA, and SDMA. 149. To provide knowledge of international standards and regulations governing satellite communications. 150. To develop an awareness of the various applications of satellite communications, including direct broadcast satellite (DBS) systems. 151. To teach students to perform link budget calculations and assess the feasibility of a satellite communications system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	148. Understanding the evolution of satellite communications and its various applications. 149. Ability to calculate elevation and azimuth angles to the satellite. 150. Knowledge of frequency allocation for satellite communications. 151. Understanding the types of satellites and their respective orbits, as well as examples such as INTELSAT and U.S DOMSATS. 152. Knowledge of Kepler's laws and their application to satellite communications. 153. Understanding the various segments of satellite communications systems, including radio wave propagation and ionospheric effects. 154. Ability to calculate satellite link parameters, including EIRP, transmission losses, and noise temperature. 155. Knowledge of different satellite access technologies such as FDMA, TDMA, CDMA, and SDMA. 156. Understanding of international standards such as the T-carrier telephony system and compressor/expander technology. 157. Knowledge of centralized and decentralized control systems, including the SPADE system.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Project** is a phrase that can refer to a variety of tasks, activities, or deliverables in different contexts. Generally, a project involves a set of planned activities with a defined objective or goal [30 hrs.]. **A report** is a document that presents information about a specific topic, usually including findings, analysis, and recommendations. Projects often require reports as part of the deliverables or outcomes. [40 hrs.] Revision problem and tutorial classes [15 hrs.]

	Quizzes [4 hr.]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The primary strategy that will be adopted in delivering this module is to encourage students' participation in 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 reports involving some interesting sampling

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	5	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments				
	Projects /				
	Report				
Summative assessment	Midterm Exam	1.30 hr	30% (30)	8	LO # 1-5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to Satellite Communications, Evolution of Satellite Communication, Elevation Angle to Satellite, Azimuth Angle to Satellite, Applications of Satellites, Frequency allocation for satellite
Week 2	Type of Satellites (Based on Orbits): (GEO, LEO, MEO, HEO, Polar Orbit),
Week 3	Satellite Examples (INTELSAT, U.S DOMSATS), Direct Broadcast Satellite System DBS.
Week 4	Kepler's Laws (First and Second).
Week 5	Satellite Communications Segments, Radio Wave propagation.
Week 6	Ionospheric Effects, Rain Attenuation, Other Propagation Impairments, Angle of Elevation and

	propagation impairments, Propagation delay.
Week 7	Satellite Construction, Satellite Transponder, Tracking, Telemetry, Command, and Monitoring.
Week 8	Mid-term Exam
Week 9	Satellite Link Parameters, Equivalent Isotropic Radiated Power (EIRP), Transmission Losses.
Week 10	Bad weather loss, Noise Temperature.
Week 11	Uplink and down signal budget calculations, Microwave Interference.
Week 12	Satellite Access (FDMA, TDMA, CDMA, SDMA).
Week 13	International Standards (The T-carrier TDM/PCM telephony system), Compressor and expander (Compander).
Week 14	Centralized and Decentralized Control, SPADE system.
Week 15	Discussions repots
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	[1] Louis J. Ippolito, Jr, "Satellite Communications Systems Engineering", 2008. [2] G. Maral & M. Bousquet," Satellite Communications Systems", 5th Edition, 2009.	Yes
Recommended Texts	Bruce R. Elbert, "Introduction to Satellite Communication", 3rd Edition, 2008.	Yes
Websites	https://www.tutorialspoint.com/satellite_communication/	

	satellite_communication_introduction.htm

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Digital Signal processing I** **معالجة الاشارة الرقمية I**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial**
Module Code	**EEC 404**	
Number of Credit Hours (Total) /	**3/2**	

Number of Units (Total)			☐ **Practical** ☐ **Seminar**	
Module Level	UGx11 4	**Semester of Delivery**		7
Administering Department	2 - **(Electrical Engineering)**	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title	Asst. Prof	**Module Leader's Qualification**		PhD.
Module Tutor	Dr. Mohammed Younis Thanoun	**e-mail**	myounisth@uomosul.edu.iq	
Peer Reviewer Name	Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date	01/09/2023	**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. Demonstrate an understanding of basic discrete-time systems, linearity, time-invariance, stability, impulse response and discrete convolution. 2. Implement discrete time systems, recursive and non-recursive realizations. 3. Perform Z transform and finding the inverse Z transform including its properties. 4. Demonstrate an understanding of frequency analysis of both continuous and discrete signals. 5. Demonstrate an understanding of frequency response of linear time invariant systems. 6. Demonstrate an understanding of discrete Fourier transform, its properties and applications.

	7. Design FIR and IIR digital filters.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Discrete time signals. 2. Discrete Convolution and Correlation. 3. Z-transform. 4. Fourier Series, Fourier Transform. 5. Frequency Response of LTI Systems. 6. Sampling and Reconstruction of Signals. 7. Discrete and Fast Fourier Transform. 8. Design of FIR and IIR Digital Filters.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - introduction to the theory of digital signal processing (DSP)** . Introduction to discrete linear systems Digital Signals and Systems: Classification of Systems, Linear System, Time-Invariant System, Causal System, Stability [6 hrs.] Digital Convolution: Graphical Method, Table Lookup Method, Matrix by Vector Method, Linear Convolution and Circular Convolution, Deconvolution [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Fourier transforms AND Z- transforms** Discrete-Time Fourier Transform and Linear Time Invariant Systems[6 hrs.] The Z transform, Regions of convergence and Z-transform properties and Inverse Z-transform[6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part C- The discrete Fourier transform and fast Fourier transform** The discrete Fourier transform[6 hrs.] The fast Fourier transform [6 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.]

	Part D- Digital filter design Digital filter design (Finite impulse response (FIR) filters) [6 hrs.] Infinite impulse response (IIR) filters) [6 hrs.] Structures and properties of FIR and IIR filters and review[6 hrs.] Revision problem and tutorial classes [9 hrs.] Quizzes [1 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 and by considering type of some software program involving some sampling activities that are interesting to the students (Matlab and Labview).

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments			6	LO #1–7
	Projects				
	Report			Continuous	All
Summative	**Midterm Exam**	1.30 hr	30% (30)	7	LO # 1-5

assessment	**Final Exam**	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Introduction to discrete linear systems Digital Signals and Systems: Classification of Systems, Linear System, Time-Invariant System, Causal System, Stability
Week 2	Digital Convolution: Graphical Method, Table Lookup Method, Matrix by Vector Method, Linear Convolution and Circular Convolution, Deconvolution
Week 3	Fourier transforms review
Week 4	Discrete-Time Fourier Transform and Linear Time Invariant Systems [1] Transform definitions. [2] Theorems. [3] Frequency response of linear time invariant systems. [4] Phase and group delays
Week 5	The Z transform, Regions of convergence and Z-transform properties. Inverse Z-transform
Week 6	Sampling [1] Sampling continuous-time signals: the sampling theorem. [2] Aliasing. [3] Re-sampling digital signals.
Week 7	Midterm review.
Week 8	Mid-term Exam
Week 9	The discrete Fourier transform [1] Definition of DFT and relation to Z-transform. [2] Properties of the DFT. [3] Linear and periodic convolution using the DFT. [4] Zero padding, spectral leakage, resolution and windowing in the DFT
Week 10	The fast Fourier transform

	[1] Decimation in time FFT. [2] Decimation in frequency FFT.
Week 11	Digital filter design (Finite impulse response (FIR) filters) [1] Window design techniques. [2] Kaiser window design technique. [3] Equiripple approximations.
Week 12	Digital filter design (Infinite impulse response (IIR) filters) [1] Bilinear transform method. [2] Examples of bilinear transform method
Week 13	Structures and properties of FIR and IIR filters and review [1] IIR - Direct, parallel and cascaded realizations. [2] FIR – Direct and cascaded realizations [3] Coefficient quantization effects in digital filters
Week 14	Final review
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1) "Digital Signal Processing Principles, Algorithms, and applications", John G. Proakis, Dimitris G. Manolakis, Third Edition (1996). 2) "Applied Digital Signal Processing Theory and Practice", Dimitris G. Manolakis, Vinay K. Ingle, First Edition (2011).	no
Recommended Texts	Schaum's Outline of Digital Signal Processing, M. Hays, McGraw-Hill, 1999: This complements Mitra with lots of worked examples and summaries of each topic as well as a large number of additional problems.	No
Websites	https://www.softwaretestinghelp.com/digital-signal-processing-tutorial/	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Microelectronics I** **الالكترونيات الدقيقة I**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical**
Module Code	**EEC 405**	
Number of Credit Hours (Total) / Number of Units	**3/3**	

(Total)			☐ **Seminar**		
Module Level		UGx11 4	**Semester of Delivery**		7
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	Dr. Mohammad Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	
Peer Reviewer Name		Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date		01/09/2023	**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	152. To develop problem solving skills and understanding of microelectronics concepts with the microwave devices. 153. To understand microelectronics with electronics devices. 154. To include the microelectronics with available software such as CST simulation, ADS simulation, and COMSOL simulation.
Module Learning Outcomes	158. Recognize how microelectronics connected with the electronics devices.

مخرجات التعلم للمادة الدراسية	159. List the various terms associated with microelectronics. 160. Summarize what is meant by a microelectronics. 161. Identify microelectronics applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A – microwave devices** Microwave devices: Energy and band theory, Diode, PN, IMPAD, gun diode, IGBT, Tyristor, Triac, DIAC, TTL,RTL, ECL, LED, MS, . [35 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B- Digital circuit analyses** DTL , MOS, CMOS, DMOS, NMOS, [12 hrs.] Revision problem and tutorial classes [8 hrs.] Quizzes [1 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Module Evaluation

تقييم المادة الدراسية

	Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome

As					
Formative assessment	**Quizzes**	5	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments				
	Projects / Lab.				
	Report			----	----
Summative assessment	**Midterm Exam**	1.30 hr	30% (30)	7	LO # 1-5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Energy and band theory,
Week 2	, PN diode
Week 3	IMPAD diode
Week 4	Gun diode
Week 5	IGBT transistor
Week 6	Thyristor
Week 7	Triac,
Week 8	TTL, RTL, DTL

Week 9	Metal semiconductor device
Week 10	DIAC device
Week 11	Fabrication of circuits
Week 12	Fabrication of circuits
Week 13	LASER light concept + LASER diode
Week 14	Solar cell
Week 15	Solar cell
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	ELECTRONIC DEVICES Floyd	Yes
Recommended Texts	Microelectronics: Circuit Analysis and Design by Neaman	No
Websites	Microelectronics for Microwave devices	

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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
(0 – 49)	**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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Computer Networks II II شبكات الحاسوب	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical**
Module Code	EEC 411	
Number of Credit Hours (Total) / Number of Units (Total)	**3/2**	

		☐ **Seminar**	
Module Level	UGx11 4	**Semester of Delivery**	8
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Firas S. Alsharbaty	**e-mail**	alsharbaty@uomosul.edu.iq
Peer Reviewer Name	Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq
Scientific Committee Approval Date	01/09/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Computer Networks	**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	155. Understand Basic concepts of network security. 156. History of encryption techniques. 157. AES symmetric encryption technique. 158. public-key encryption and RSA. 159. Message Authentication and Hash Functions. 160. Authentication Protocols. 161. Cryptographic Systems. 162. Network Security Tools.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	This course provides students with basic knowledge in: Basic concepts of network security; History of encryption techniques; AES symmetric encryption technique; public-key encryption and RSA; Message Authentication and Hash Functions; Authentication Protocols; Cryptographic Systems: Secure Socket Layer (SSL), Virtual Private Network (VPN), and Kerberos; Access Control of Computer Resources; Computer Viruses, Malicious and Antivirus Software; Network Security Tools: Firewall, Intrusion Detection System (IDS) and Intrusion Prevision System (IPS); Web Security, Email Security and Password Management; and Security of Wireless Networks.
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lessons with electronic slides' projection, live demos and training on emulation and network tools and connected devices. In relation to the kind of activities and didactical methods adopted, the attendance to

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	5	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	5	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments			6	LO #1–7
	Projects / Lab.				

	Report			----	----
Summative assessment	**Midterm Exam**	1.30 hr	30% (30)	7	LO # 1-5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Basic Concepts of Network Security.
Week 2	History of Encryption Techniques.
Week 3	Symmetric Encryption Technique and AES.
Week 4	Public-Key Encryption Techniques and RSA.
Week 5	Message Authentication and Hash Functions.
Week 6	Authentication Protocols & Cryptographic Systems: Secure Socket Layer (SSL).
Week 7	Virtual Private Network (VPN).
Week 8	Kerberos.
Week 9	Computer Viruses, Malicious. Antivirus Software.
Week 10	Antivirus Software.
Week 11	Firewall Architecture and Administration.
Week 12	Intrusion Detection System (IDS) and Intrusion Prevision System (IPS).
Week 13	Web Security, Email Security and Password Management.
Week 14	The concept of Blockchain
Week 15	Consensus Algorithms
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Cryptography and network Security Principles and Practice Sixth edition William Stallings. 2- Network Security eSSeNtialS: Applications and Standards Sixth edition Global edition.	Yes
Recommended Texts	Computer Security Principles and Practice Fourth Edition Global Edition William Stallings Lawrie Brown.	No
Websites		

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

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Electronics and Communications Lab. III** مختبر الالكترونيك والاتصالات III	**Module Delivery**
Module Type	**Core**	☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical**
Module Code	**EEC 407**	
Number of Credit Hours (Total) / Number of Units	**4/2**	

(Total)			☐ **Seminar**		
Module Level		UGx11 4	**Semester of Delivery**		7
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	Ahmed I Alghannam		**e-mail**	ahmed_edrees@uomosul.edu.iq	
Peer Reviewer Name		Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date		01/09/2023	**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 lab course tries to present practical experiments based on several hardware devices like microcontroller digital circuits boards also simulation environments like MATLAB, ORCAD, Arduino IDE, and Opnet software. After completing this course, students should have the knowledge about: 1. Microcontroller programming. 2. Digital electronics circuit and application. 3. Various types of Computer networks and its configurations. 4. Microcontrollers and its application. 5. Understanding control circuits theory. 6. Solar cell characteristics and its connection methods. 7. Digital communication techniques. 8. Signal analysis using MATLAB and microcontroller.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	162. Dealing with laboratory equipment and electrical elements in a professional and scientific manner. 163. Ability to analyze digital circuit in time domain. 164. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts. 165. Develop the student's ability to simulate electronic circuits in line with his scientific abilities. 166. Students will be able to understand practically digital carrier modulation system and the differences between different techniques. 167. Learn programing in C-language for important basic algorithms. 168. Students will be able to introduce the world of digital controller of digital circuit using microcontroller. 169. Gain the ability to build signal analysis device in frequency domain using Arduino and MATLAB.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Pam and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programing using C-language. [10hrs.] Quizzes [1 hr.] Part B Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 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 labs, interactive experiments and software simulation in laptops/PC.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	4,8,12	All
	Report				
	Practical Exam				
	Onsite assignment	1	5%(5)		
Summative assessment	Theoretical Exam	1	30% (30)	7	All
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

Week	Material Covered
Week 1	1. Pulse Amplitude Modulation (PAM) & Pulse Code Modulation (PCM)
Week 2	2. Introduction to OPNET Modeler
Week 3	3. Time Division Multiplexing (TDM)
Week 4	4. Introduction to Digital Carrier Modulation
Week 5	5. Root locus Design in MATLAB
Week 6	6. QAM Modulation and Demodulation
Week 7	7. Network Protocols Capturer and Analyzer

Week 8	**8. Ethernet and Bus Topology**
Week 9	**9. Ethernet and Star Topology**
Week 10	**10. Serial Data Communication and Flow Control Using PC COM Port With Matlab**
Week 11	**11. Understanding ADC concept using Arduino microcontroller**
Week 12	**12. Understanding system transfer function using MATLAB**
Week 13	**13. PISO/SIPO digital data transmission concept**
Week 14	**14. Understanding the concept of Data acquisition using ARDUINO**
Week 15	**15. Using Arduino microcontroller to drive a stepper motor driver circuit**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	-Jerry Luecke “Analog and Digital Circuits for Electronic Control System Applications” Elsevier. -Forouzan, B.A. "Data Communications and Networking". 4th Edition, McGraw Hill Higher Education, New York. -Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson, 2nd Edition -Proakis, J. G., and M. Salehi. "Digital communications 5th Edition McGraw-Hill." New York (2008). -Farid Golnaraghi and KUO “Automatic Control Systems” Simon Frase, Ninth Edition -Simon Monk “**Programming Arduino® Next Steps”** Going Further with Sketches Second Edition, Copyright © 2019 by	Yes (electronic books)

	McGraw-Hill Education	
Recommended Texts		No

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	**Graduation Project** مشروع التخرج	**Module Delivery**
Module Type	**Suport**	☐ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical**
Module Code	EEC 418	
Number of Credit Hours (Total) / Number of Units (Total)	**4/4**	

		☒ **Seminar**	
Module Level	UGx11 4	**Semester of Delivery**	7
Administering Department	2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)
Module Leader	Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Firas S. Alsharbaty	**e-mail**	alsharbaty@uomosul.edu.iq
Peer Reviewer Name	Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq
Scientific Committee Approval Date	01/09/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Engineering Project Design & Planning	**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	The graduation project aims to provide students with the opportunity to apply theoretical and practical engineering knowledge to solve a real engineering problem. The project is divided into two complementary parts. Part I focuses on problem definition, literature review, and project planning, while Part II emphasizes implementation, testing, analysis, and final reporting.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of the Graduation Project I, students will be able to: • Identify and formulate an engineering problem. • Conduct a comprehensive literature review using scientific sources. • Propose suitable methodologies and system designs. • Implement hardware, software, or simulation-based solutions. • Analyze results critically and validate performance. • Prepare a complete technical report following academic standards. • Present and defend the project professionally.

Indicative Contents المحتويات الإرشادية	• Selection and approval of project topic. • Problem definition and objective formulation. • Literature review and background study. • System requirements and methodology design. • Project planning and timeline preparation.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The project is delivered through supervised independent work. Students meet regularly with their academic supervisor for guidance, feedback, and progress evaluation. Emphasis is placed on self-learning, problem-solving, and professional responsibility.

Module Evaluation

تقييم المادة الدراسية

As		**Time/ Number**	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Progress Meetings / Review**	2	5% (5)	2-12	LO #1, #2, #4, #6, #7, #8, #9
	Interim Assignments (Literature review, methodology, progress reports)			6	LO #1–#7
	On-site Evaluation /			7	LO #1–#5

	Supervisor Observation				
		1	5%(5)		
		1	30% (30)		
Summative assessment	**Final Project Report & Oral Defense**	3hr	60% (50)	16	All LOs
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	

Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mobile Communications** **الاتصالات المتنقلة**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEC 403**				
Number of Credit Hours (Total) / Number of Units (Total)	**3/3**				
Module Level		UGx11 4	**Semester of Delivery**		8
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	

Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	PH.D.
Module Tutor	Dr. Saad Ahmed Ayoob	**e-mail**	sa_ah_ay@uomosul.edu.iq
Peer Reviewer Name	Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq
Scientific Committee Approval Date	01/09/2023	**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	163. Introducing the different types of mobile communication systems and their characteristics. 164. Exploring the cellular concept and its fundamental system design principles. 165. Investigating frequency reuse techniques and channel assignment strategies. 166. Examining handoff strategies and practical considerations for successful handoff. 167. Analyzing interference and its impact on system capacity, specifically co-channel and adjacent channel interference. 168. Demonstrating the effectiveness of power control techniques in reducing interference. 169. Discussing trunking and grade of service concepts, including Erlang B and C blocked call models. 170. Understanding methods for improving coverage and capacity in cellular systems. 171. Evaluating the evolution of cellular systems across generations, including 1G, 2G, 3G, and 4G. 172. Comparing different cellular systems, such as AMPS, ETACS, N-AMPS, USDC(D-AMPS), GSM, CDMA, and LTE.

	173. Introducing large-scale propagation models and their practical link budget design using path loss models. 174. Exploring outdoor propagation models, such as Okumura model, Hata model, and Walfisch-Bestoni models. 175. Understanding indoor propagation, small-scale fading, and multipath, including their associated properties such as Doppler shift, shadowing, and multipath propagation. 176. Analyzing parameters of mobile multipath channels and types of small-scale fading, such as Rayleigh and Rician distributions.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	170. Understanding the fundamentals and types of mobile communication systems. 171. Understanding the concept of cellular systems, system design fundamentals, and frequency reuse. 172. Understanding channel assignment and handoff strategies, as well as practical handoff considerations. 173. Understanding interference and system capacity, co-channel interference, adjacent channel interference, and power control for reducing interference. 174. Understanding trunking, grade of service, and blocked call analysis (Erlang B and Erlang C models). 175. Understanding techniques for improving coverage and capacity in cellular systems. 176. Understanding the architecture, frequency hopping, direct sequence spread spectrum, and comparison of 1G (AMPS, ETACS, N-AMPS, USDC), 2G (GSM, IS-95, IS-54), 3G (UMTS), and 4G (WiMAX, LTE) mobile communication systems. 177. Understanding large scale propagation models, outdoor propagation models such as Okumura, Hata, and Walfisch-Bestoni, and indoor propagation, small scale fading, and multipath. 178. Understanding the properties of small-scale multipath propagation, Doppler shift, shadowing, and parameters of mobile multipath channels. 179. Understanding types of small-scale fading and their distributions, such as Rayleigh and Rician distributions, and their impact on mobile communication systems.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Practical Workshops** is a phrase that can refer to a variety of tasks, activities, or deliverables in different contexts. Generally, a project involves a set of planned activities with a defined

	objective or goal [12 hrs.]. **Guest Lectures:** Case studies can be used to illustrate how a particular technology was adopted and practiced by a country [4 hrs.]. **Visits to a Mobile Communications Company:** Students can get a hands-on experience by visiting a mobile communication company for observation. They can see how mobile communication technology is used and to encourage inquiry into areas that they desire to explore [12 hrs.]. **A report** is a document that presents information about a specific topic, usually including findings, analysis, and recommendations. Projects often require reports as part of the deliverables or outcomes. [40 hrs.]. **Online Resources:** Utilizing online resources like video tutorials, discussion forums, online articles are a significant way to supplement the learning experience. Providing students with online resources guarantees their access to the latest technology trends and expands their knowledge beyond the scope of the classroom lectures [20 hrs.]. Revision problem and tutorial classes [15 hrs.]. Quizzes [4 hr.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Learning and teaching strategies for a module on mobile communication may include: - Lectures: Traditional classroom lectures are often used in teaching technical subjects like mobile communication. Lectures can be used to introduce theoretical concepts and provide background context, and frameworks on which the rest of the subject matter can be structured. - Practical Workshops: Mobile communications are best learned by doing. Practical workshops such as wireless communication system training, laboratory experiments with simulation software, or implementation projects are all excellent ways to help students get hands-on experience with the subject matter. - Case Studies: In the teaching of mobile communications, students learn from examples. Case studies can be used to illustrate how a particular technology was adopted and practiced by a country and its economic impact on the community. - Group Discussion: Encouraging group discussion among students can help to foster a deeper understanding of the subject matter. Group discussions can be used to encourage students to exchange different points of view and collaborate to find solutions. - Guest Lectures: Inviting industry professionals to speak to students can be an

	educational and insightful experience. Guest lectures enhance the credibility of the module, give students access to real-world technology funding and provide insights into the relevant industry. - Visits to a Mobile Communications Company: Students can get a hands-on experience by visiting a mobile communication company for observation. They can see how mobile communication technology is used and to encourage inquiry into areas that they desire to explore. - Online Resources: Utilizing online resources like video tutorials, discussion forums, online articles is a significant way to supplement the learning experience. Providing students with online resources guarantees their access to the latest technology trends and expands their knowledge beyond the scope of the classroom lectures. These strategies, when utilized effectively, ensure that students gain a comprehensive understanding of the subject matter and are prepared for their academic, industrial, and social engagements in the future.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments			2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments			6	all
	Report	1	5%(5)	9	all
Summative assessment	Midterm Exam	1	30% (30)	8	LO # 1-5
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered

Week 1	Wireless Communication Systems. Types of Mobile Communication Systems. The Cellular Concept - System Design Fundamentals.
Week 2	Frequency Reuse. Channel Assignment Strategies. Handoff Strategies. Practical Handoff Considerations.
Week 3	Interference and System Capacity. Co-channel Interference, Adjacent Channel Interference. Power Control for Reducing Interference.
Week 4	Trunking and Grade of Service. Blocked Calls Cleared (Erlang B). Blocked Calls Delayed (Erlang C). Improving coverage and capacity in cellular systems.
Week 5	Cellular Systems. 1G: AMPS, ETACS, N-AMPS, USDC(D-AMPS). 2G: Global System for Mobile GSM. GSM System Architecture.
Week 6	Spread spectrum (frequency hopping direct sequence). Frequency Hopping Spread Spectrum (FH-SS). Direct Sequence Spread Spectrum (DS-SS).
Week 7	2G, Code Division Multiple Access (CDMA). Comparison of the IS-95, IS-54, and GSM systems.
Week 8	4G: Long-Term Evolution (LTE).
Week 9	Large Scale Propagation Models. Practical Link Budget Design Using Path Loss Models. Outdoor Propagation Models. Okumura Model, Hata Model, Walfisch-Bestoni Model
Week 10	Indoor Propagation, Small Scale Fading and Multipath. Properties of Small-Scale Multipath Propagation. Doppler Shift, Shadowing, Multipath Propagation. Parameters of Mobile Multipath channels. Types of Small-Scale Fading, Rayleigh and Ricean Distributions
Week 11	Plane wave: normal incidence.
Week 12	Plane wave: oblique incidence
Week 13	Radio wave propagation. ground wave propagation.
Week 14	Radio wave propagation. troposphere wave propagation.
Week 15	Radio wave propagation. ionosphere wave propagation.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts	[1] T. S. Rappaport," Wireless Communications", 2nd edition, 2002. [2] J. H. Schiller," Mobile Communications", 2nd edition, 2003.	Yes
Recommended Texts	Bruce R. Elbert, "Introduction to Satellite Communication", 3rd Edition, 2008.	Yes
Websites	https://www.tutorialspoint.com/satellite_communication/satellite_communication_introduction.htm	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Microelectronics II** **الإلكترونيات الدقيقة II**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 415				
Number of Credit Hours (Total) / Number of Units (Total)	**3/3**				
Module Level		UGx11 4	**Semester of Delivery**		8
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	Dr. Mohammad Tariq Yaseen		**e-mail**	mtyaseen@uomosul.edu.iq	

Peer Reviewer Name	Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq
Scientific Committee Approval Date	01/09/2023	**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	177. To develop problem solving skills and understanding of microelectronics concepts with the microwave devices. 178. To understand microelectronics with electronics devices. 179. To include the microelectronics with available software such as CST simulation, ADS simulation, and COMSOL simulation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	180. Recognize how microelectronics connected with the electronics devices. 181. List the various terms associated with microelectronics. 182. Summarize what is meant by a microelectronics. 183. Identify microelectronics applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Part A - Semiconductor Materials and Diodes + The Bipolar Junction Transistor + The Field-Effect Transistor+ Basic FET Amplifiers + Integrated Circuit Biasing and Active Loads + Basic BJT Amplifiers**

	[75 hrs.] Revision problem and tutorial classes [6 hrs.] Quizzes [3 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 and by considering type of simple experiments involving some sampling activities that are interesting to the students.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	5% (5)	4,8,12	LO #1, 5, 8 and 9
	Assignments	1	5% (5)	2 to 12	LO #1, 2, 4, 6 7, 8 and 9
	Onsite Assignments				
	Projects / Lab.				
	Report				
Summative assessment	Midterm Exam	1.5 hr	30% (30)	7	LO # 1-5
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Semiconductor Materials and Diodes
Week 2	Semiconductor Materials and Diodes
Week 3	The Bipolar Junction Transistor
Week 4	The Bipolar Junction Transistor
Week 5	The Field-Effect Transistor
Week 6	The Field-Effect Transistor
Week 7	Basic FET Amplifiers
Week 8	Basic FET Amplifiers
Week 9	introduction to network theorems, types of source: independent and dependent voltage and current sources and their transformation
Week 10	Integrated Circuit Biasing and Active load
Week 11	Integrated Circuit Biasing and Active load
Week 12	Basic BJT Amplifiers
Week 13	Basic BJT Amplifiers
Week 14	Differential Amplifier
Week 15	Differential Amplifier
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Microelectronics: Circuit Analysis and Design by Neaman ELECTRONIC DEVICES Floyd	Yes
Recommended Texts	Microelectronics: Circuit Analysis and Design by Neaman	yes

	ELECTRONIC DEVICES Floyd	
Websites	**Microelectronics for Microwave devices**	

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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Computer Networks I شبكات الحاسوب I			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 401				
Number of Credit Hours (Total) / Number of Units (Total)	**3/2**				
Module Level		UGx11 4	**Semester of Delivery**		7
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Firas S. Alsharbaty		**e-mail**	alsharbaty@uomosul.edu.iq	
Peer Reviewer Name		Dr Saad Wasmi	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	

	Osman		
Scientific Committee Approval Date	01/09/2023	**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	180. Understand basics of computer network communications. 181. Understand and identify network devices and their role/functions within a given network. 182. Identify the different types of network topologies and protocols. 183. Explain the layers of the OSI model and TCP/IP. Explicitly explain the functions for each layer. 184. Understand and building the skills of sub-netting. 185. Be able to administer a network regardless its size 186. Familiarity with the basic protocols of computer networks, and the way they can be used to assist in network design and implementation
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The student will learn: - the fundamentals of the computer networks; - main technologies and communication protocols, including the TCP/IP suite for Internet and packet-based communication; - the Internet architecture, the way Internet operates, inter-process communication and the design and development of inter-process communication protocols, including the principles and technologies for Wireless communications.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	**Part A - OSI and TCP/IP models** OSI and TCP/IP models and their associated protocols to explain how data flows in a network **Part B- Wired LANs: Ethernet** Networks of networks and inter-networking. Forwarding and routing IP (local and ISP-based - interdomain). Router. Multicasting. **Part C- Application layer** Examples of protocols and services at the application layer. SMTP (email), http (WWW), DNS, streaming video, gaming, P2P, VoIP.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Lessons with electronic slides' projection, live demos and training on emulation and network tools and connected devices. In relation to the kind of activities and didactical methods adopted, the attendance to this class will require the preliminary participation of all the students to the Modules 1 and 2 of the Safety rules on study places

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (5)	4,8,12	All
	Assignments	1	5% (5)	2 to 12	All
	Onsite Assignments			6	LO #1–7
	Projects / Lab.			Continuous	----

	Report			----	All
Summative assessment	**Midterm Exam**	1.5 hr	30% (30)	7	All
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	definitions, history and development of computer networks. Topologies, network resources, and logical channels. Computer Network performances: indexes and their meaning in different application contexts.
Week 2	Circuit-switched and packet-switched networks. Network communication protocols. Network architectures: HW and SW. Network Service architectures: Client/server, Peer to peer, hybrid.
Week 3	ISO OSI Reference Model. Physical layer. Data Link layer, Medium Access Control techniques, MAC addressing, Error detection and correction.
Week 4	Local Area Network technologies: hub, repeater, bridge, switch. LAN connectivity. LAN topologies and links.
Week 5	Network Layer: IPv4 protocol and addressing. IPv4 network classes, CIDR, IP configuration. Network Address Translation (NAT). SDN e OpenFlow. ICMP. ARP e RARP. DHCP.
Week 6	Subnetting and super netting, Design of network and subnetworks in IP domains.
Week 7	IPv6. Domains and hierarchical addressing.
Week 8	Management and configuration of LANs (SNMP).
Week 9	Networks of networks and inter-networking. Forwarding and routing IP (local and ISP-based - interdomain). Router. Multicasting.
Week 10	Transport layer: Transmission Control Protocol (TCP), performance of end-to-end communications, Congestion control.

Week 11	Flow control.
Week 12	Sockets and socket programming (examples) with UDP/TCP.
Week 13	Session and Presentation layers.
Week 14	Application layer: examples of protocols and services at the application layer. SMTP (email), http (WWW), VoIP.
Week 15	Network Analysis.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Behrouz A. Forouzan: DATA COMMUNICATIONS AND NETWORKING Fourth Edition. Behrouz A. Forouzan: TCP/IP PROTOCOL SUITE, FOURTH EDITION	Yes
Recommended Texts	- J.F. Kurose, K.W. Ross, Computer Networking: A Top-Down Approach, last edition	No
Websites	https://classroom.google.com/u/0/c/NTk1MTM0ODM4MzE3	

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	**FX –** Fail	راسب (قيد	(45-49)	More work required but credit awarded

(0 – 49)		(المعالجة		
	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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics and Communications Lab. IV** **مختبر الالكترونيك والاتصالات IV**			**Module Delivery**	
Module Type	**Core**			☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 417				
Number of Credit Hours (Total) / Number of Units (Total)	**4/2**				
Module Level		UGx11 4	**Semester of Delivery**		8
Administering Department		2 - (Electrical Engineering)	**College**	UoM2 - (Engineering)	
Module Leader	Dr. Omar Sharaf Deen Yehya Al-Yozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Assist. Prof.	**Module Leader's Qualification**		PH.D.
Module Tutor	Ahmed I Alghannam		**e-mail**	ahmed_edrees@uomosul.edu.iq	
Peer Reviewer Name		Dr Saad Wasmi Osman	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	

Scientific Committee Approval Date	01/09/2023	**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 lab course tries to present practical experiments based on several hardware devices like microcontroller digital circuits boards also simulation environments like MATLAB, ORCAD, Arduino IDE, and Opnet software. After completing this course, students should have the knowledge about: 1. Microcontroller programming. 2. Digital electronics circuit and application. 3. Various types of Computer networks and its configurations. 4. Microcontrollers and its application. 5. Understanding control circuits theory. 6. Solar cell characteristics and its connection methods. 7. Digital communication techniques. 8. Signal analysis using MATLAB and microcontroller.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	184. Dealing with laboratory equipment and electrical elements in a professional and scientific manner(i). 185. Ability to analyze electrical circuits and understand the nature of their work(ii). 186. Building a scientific mentality for the student through his ability to interpret the practical results according to theoretical concepts(iii). 187. Develop the student's ability to design simple electronic circuits in line with his scientific abilities(iv). 188. Students will be able to understand practically the most of digital carrier modulation system and the differences between the QAM and types of PSK.

	189. Students will be able to mitigate the Intersymbol Interference in the baseband systems by satisfying the conditions for zero ISI, get indications of the BER during the monitoring of the eye pattern (eye diagram), also can deal with the additive noise channel and get the transmitted data at the receiver using the sampling receiver.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A Pam and PCM systems, sampling, quantization, and the encoding. PCM Transmission Bandwidth, PCM Signal-to-Quantization-Noise Ratio. Learn Arduino programing using C-language. Understanding Control theory using Matlab [10hrs.] Quizzes [1 hr.] Part B Binary line coding, extract the differences between the NRZ and RZ. Digital carrier modulation On-Off Keying (OOK) and Amplitude Shift Keying (ASK). Network connection topologies. Data acquisition concept. System transfer function characteristics in MATLAB. Inter symbol interference [20 hrs.] Revision problem and tutorial classes [10hrs.] Quizzes [1 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 labs, interactive experiments and software simulation in laptops/PC.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative	**Quizzes**	2	5% (5)	4,8,12	All

assessment	**Report**			1 to 15	All
	Practical Exam			8,15	
	Onsite assignment	1	5%(5)		
Summative assessment	**Theoretical Exam**	1	30% (30)	7	All
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week	**Material Covered**
Week 1	**16. Intersymbol Interference, Pulse Shaping and Sampling Receiver (part I)**
Week 2	**17. Intersymbol Interference, Pulse Shaping and Sampling Receiver (part II)**
Week 3	**18. Design a Digital clock using IC7490**
Week 4	**19. Digital Carrier Modulation part II**
Week 5	**20. Introduction to PLC and ladder logic programming**
Week 6	**21. Industrial wireless network**
Week 7	**22. Reading a matrix of photo sensors using microcontroller and MATLAB**
Week 8	**23. Solar cell characteristics and its connection methods**
Week 9	**24. Principle of DSP using Matlab and micro-controller**
Week 10	**25. State space module in MATLAB**
Week 11	**26. State variable feedback design**
Week 12	**27. Block diagram reduction**
Week 13	**28. Frequency response**
Week 14	**29. ADHOC Wireless Technology**

Week 15	30. Infrastructure Wireless Technology

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-Jerry Luecke “Analog and Digital Circuits for Electronic Control System Applications” Elsevier. -Forouzan, B.A. "Data Communications and Networking". 4th Edition, McGraw Hill Higher Education, New York. -Gary Dunning, “Introduction to Programmable Logic Controllers”, Thomson, 2nd Edition -Proakis, J. G., and M. Salehi. "Digital communications 5th Edition McGraw-Hill." New York (2008). -Farid Golnaraghi and KUO “Automatic Control Systems” Simon Frase, Ninth Edition	Yes (electronic books)
Recommended Texts		No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors

	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group **(0 – 49)**	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Physics III** **III الفيزياء**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 420				
Number of Credit Hours (Total) / Number of Units (Total)	**3/3**				
Module Level		4	**Semester of Delivery**		8
Administering Department		Electrical Dept.	**College**	Engineering	
Module Leader	Dr. Omar Sharaf Al-Deen Yehya		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Prof	**Module Leader's Qualification**		Doctor
Module Tutor	Mr. Ahmad Abduljabbar Ismael		**e-mail**	a.a.ismail@uomosul.edu.iq	

Peer Reviewer Name	Dr. Mohammed Obaid	**e-mail**	mohammed.obaid@uomosul.edu.iq
Scientific Committee Approval Date		**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	• To develop applied skills in employing advanced electromagnetic laws to analyze electromechanical energy conversion systems (motors, generators, and relays). • To apply physical principles in modeling and optimizing renewable energy systems, specifically solar photovoltaics and wind turbines. • To deepen the understanding of solid-state physics as a foundation for designing and manufacturing power electronic components like Thyristor and Triac.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Ability to calculate electromagnetic and electrostatic forces in micro-electromechanical systems (MEMS). • Understanding photon physics and charge carrier dynamics to analyze the efficiency of solar cells. • Analyzing the physical and thermal behavior of Thyristors and Triacs in high-power circuits.
Indicative Contents المحتويات الإرشادية	Part I: Physics of electromechanical forces, magnetic circuits, and electrostatic relays. Part II: Photon physics, energy bandgaps, solar conversion systems, and wind dynamics.

	Part III: Advanced semiconductor physics, carrier transport, and fabrication technology for power electronics and thermal sensors.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Lectures** • Structured lectures introduce fundamental concepts, theories, and analytical techniques in control systems. • Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. **2. Problem-Solving Sessions** • Guided tutorials focus on solving numerical and analytical problems. • Students practice stability analysis, controller design, and performance evaluation. • Active student participation is encouraged through in-class discussions. **3. Project-Based Learning** • Individual or group mini-projects involve modeling, analysis, and controller design for selected systems. **4. Self-Directed Learning** • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support deeper understanding.

	5. Continuous Feedback • Regular formative feedback is provided through assignments, quizzes, and reports. Feedback helps students identify strengths and areas for improvement.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	4	5% (5)	2, 8, 12	LO# 2, 5 and 7
	Assignments	3	5% (5)	2 to 15	LO # 1, 3, and 6
	Projects / Lab.	0	0 (0)	-----	----
	Report				
Summative assessment	Midterm Exam	1	30%(30)	11	3
	Final Exam	1	60% (60)	9	1-4
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Force Physics: Review of Maxwell's equations and Faraday's law applications in generators.
Week 2	**Magnetic Circuits:** Permeability, Hysteresis, and energy loss in electric motors. Physics of forces between charged plates and MEMS applications.

Week 3	**Electrostatic Relays:** Physics of forces between charged plates and MEMS applications
Week 4	**Renewable Energy:** Physics of light and photon absorption in semiconductors.
Week 5	**Solar Cells:** P-N junction physics under illumination; Short-circuit current and Open-circuit voltage.
Week 6	**Energy Efficiency:** Physical and environmental factors affecting solar cells (Heat and Shading).
Week 7	**Wind Energy:** Fluid dynamics, Betz's Law, and converting kinetic motion into electrical energy.
Week 8	Midterm Exam
Week 9	**Solid State Physics:** Fermi statistics, energy gaps, and doping levels in semiconductors.
Week 10	**Transistor Physics:** Transport mechanisms (Drift and Diffusion) and Field-Effect in power transistors.
Week 11	**Thyristors:** Physical structure (PNPN), triggering mechanisms, and controlled breakdown.
Week 12	**Triacs: Physics of bidirectional operation and AC power control**
Week 13	**Thermal Components: Physics of NTC and PTC conductors and thermal protection applications**
Week 14	**Applied Case Studies:** Physical modeling of an integrated system (Solar + Power Electronics).
Week 15	**Fabrication Physics:** Lithography, deposition, and ion implantation in semiconductor manufacturing.
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	*Principles of Electronic Materials and Devices* – S.O. Kasap	
	Electric Machinery Fundamentals – Stephen J. Chapman.	
Recommended Texts	Physics of Solar Cells – Peter Würfel.	

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.

نموذج وصف المادة الدراسية

Module Information
معلومات المادة الدراسية

Module Title	**CONTROL SYSTEMS I** **نظم السيطرة I**	**Module Delivery**
Module Type	**Core learning activity**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	EEC 402	
Number of Credit Hours (Total) / Number of Units (Total)	**4/3**	

Module Level	Fourth-P&M	**Semester of Delivery**	six
Administering Department	Department of Electrical Eng.	**College**	Engineering
Module Leader	Dr.Omar Sh. Alyozbaky	**e-mail**	o.yehya@uomosul.edu.iq
Module Leader's Acad. Title	Head of Dept.	**Module Leader's Qualification**	PhD
Module Tutor	Dr. Mohammed Obaid Mustafa	**e-mail**	mohammed.obaid@uomosul.edu.iq
Peer Reviewer Name	Dr. Mohammed Obaid	**e-mail**	mohammed.obaid@uomosul.edu.iq

	Mustafa		
Scientific Committee Approval Date		**Version Number**	1.1

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 this course is to provide students with a solid understanding of the **analysis, modeling, and design of control systems**. The course develops the ability to analyze system behavior, assess stability and performance, and design appropriate controllers for engineering applications. 5. Develop a strong foundation in **mathematical modeling of dynamic systems** using differential equations, transfer functions, and state-space representations. 6. Enable students to analyze the **time-domain and frequency-domain behavior** of control systems, including transient and steady-state performance. 7. Provide systematic methods for assessing **stability** using classical and modern techniques.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Model** dynamic systems using differential equations, transfer functions, and state-space representations. **Analyze** system behavior in the time and frequency domains. **Evaluate** system stability using classical and modern stability criteria.		
Indicative Contents المحتويات الإرشادية	W1-W3 Introduction and concept of control systems • Definition and classification of control systems • Basic components of a control system • Open-loop vs. closed-loop control systems		

- Advantages and disadvantages of feedback
- Review of Laplace transform fundamentals
- Basic matrix operations
- Concept and definition of transfer functions

W4-W5 Modelling of Control Systems and Transfer function

- Block diagram representation of systems
- Feedback loop representation
- Concept of signal-flow graphs
- Conversion between block diagrams and SFGs

W6-W9 Representation of control systems as matrix form

- Concept of state variables
- State-space representation
- State equations in vector–matrix form
- Compact representation of multi-variable systems
- Input, state, and output matrices
- Examples of MIMO systems

W10-W13 Analysis of control systems

- Characteristic equation of state-space systems
- Concept and importance of controllability
- Controllability tests
- Concept and importance of observability
- Observability tests

W14-W15 Time-Domain Analysis of Control Systems

- Time response specifications
- Analysis of first-order systems
- Stability considerations
- Time-domain performance indices
- Steady-state error analysis
- Error constants
- Transient response of second-order systems
- Damping ratio, natural frequency, overshoot, settling time

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Lectures** • Structured lectures introduce fundamental concepts, theories, and analytical techniques in control systems. • Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. **2. Problem-Solving Sessions** • Guided tutorials focus on solving numerical and analytical problems. • Students practice stability analysis, controller design, and performance evaluation. • Active student participation is encouraged through in-class discussions. **3. Project-Based Learning** • Individual or group mini-projects involve modeling, analysis, and controller design for selected systems. **4. Self-Directed Learning** • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support deeper understanding.

	5. Continuous Feedback • Regular formative feedback is provided through assignments, quizzes, and reports. • Feedback helps students identify strengths and areas for improvement.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	10	CONTINUES	1-2
	Assignments	1/3	5	CONTINUES	1-2
	CLASSWORK	1/1	5	CONTINUES	1-2
	Report	1/1	10	CONTINUES	1-2
Summative assessment	Midterm Exam	1.5/1	10	CONTINUES	1-2
	Final Exam	3/1	60	CONTINUES	1-2
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Basic Components of a Control system, open-Loop Control systems, Closed-closed Loop Control Systems, Laplace Transform, Matrix, Transfer function
Week 2	Theoretical Foundation and Background

	Material: Modeling of Dynamic Systems
Week 3	Introduction to Modeling of Simple Electrical Systems
Week 4	Block Diagrams
Week 5	Signal-Flow Graphs (SFGs)
Week 6	State Variable Analysis
Week 7	Vector-Matrix Representation of State Equations
Week 8	Transfer Functions, Relationship between State Equations and Transfer Function
Week 9	From Differential Equations to State Diagram
Week 10	**Exam**
Week 11	State-Transition Matrix , State-Transition Equation
Week 12	Characteristic Equations, Similarity Transformation
Week 13	Controllability and Observability of Control Systems
Week 14	Time-Domain Analysis of Control Systems
Week 15	Steady-State Error, Transient Response of a Second-Order System
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	4. Automatic Control Systems, (9th Edition), By: Golnaraghi and B. C. Kuo.	
Recommended Texts	**5.** Modern Control Engineering, (5th Edition), By: Katsuhiko Ogata.	

	6. Control Systems Engineering, (6th Edition) By: Norman S. Nise	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Chemistry** **الكيمياء**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 421				
Number of Credit Hours (Total) / Number of Units (Total)	**3/3**				
Module Level		Fourth-P&M	**Semester of Delivery**		six
Administering Department		Department of Electrical Eng.	**College**	Engineering	
Module Leader	Dr.Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Dept.	**Module Leader's Qualification**		PhD
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Peer Reviewer Name		Dr. Mohammed Obaid Mustafa	**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.1	

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	• Strengthen chemical understanding of materials used in electrical engineering. • Explain chemical degradation and aging of insulation systems. • Support material selection for high-voltage and power applications. • Introduce chemical aspects of energy storage and sustainability. • Prepare students for advanced courses in high-voltage engineering, power systems, and renewable energy.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain atomic bonding and chemical structure of electrical materials. 2. Analyze chemical aging and degradation mechanisms in insulation systems. 3. Describe dielectric behavior of gases and liquids used in power equipment. 4. Evaluate corrosion and electrochemical effects in grounding systems. 5. Assess chemical principles behind modern energy storage technologies. 6. Apply sustainability concepts to electrical engineering materials.
Indicative Contents المحتويات الإرشادية	Part A – Chemical Foundations and Electrical Engineering Materials Atomic structure and periodic trends; chemical bonding and relation to electrical conductivity, dielectric strength, and thermal stability; structure-property relationships in conductors, insulators, and semiconductors. Metals and alloys; PVC, XLPE, epoxy, silicone rubber, ceramics, glass, composite insulation systems, fillers, stabilizers, and additives. [21 hrs.] Part B – Aging, Degradation, and Dielectric Media Oxidation, thermal degradation, hydrolysis, moisture effects, electrical treeing, water treeing, radiation, environmental effects, insulation lifetime, dielectric gases, SF6 chemistry and decomposition, eco-friendly alternatives, mineral and ester transformer oils, contamination, moisture, acidity, dissolved gases, oil aging and regeneration. [21 hrs.] Part C – Electrochemistry, Energy Storage, and Sustainability Electrochemical reactions, corrosion mechanisms, grounding systems, coatings, cathodic protection, battery chemistries, degradation, safety, recycling, environmental impact, green insulation materials, SF6 replacement, and regulatory considerations. [21 hrs.]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	Lectures, guided problem-solving sessions, practical case studies, self-directed learning using technical references, and continuous feedback through quizzes, assignments, and examinations.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	10	CONTINUES	1-2
	Assignments	1/3	5	CONTINUES	1-2
	CLASSWORK	1/1	5	CONTINUES	1-2
	Report	1/1	10	CONTINUES	1-2
Summative assessment	Midterm Exam	1.5/1	10	CONTINUES	1-2
	Final Exam	3/1	60	CONTINUES	1-2
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Role of chemistry in electrical engineering
Week 2	Atomic structure and bonding
Week 3	Electrical materials: metals and alloys
Week 4	Polymers and composites in insulation
Week 5	Chemical aging mechanisms
Week 6	Treeing and insulation lifetime
Week 7	Midterm Exam
Week 8	Dielectric gases and SF6

Week 9	Eco-friendly gases such as g3
Week 10	Liquid dielectrics and transformer oils
Week 11	Electrochemistry fundamentals
Week 12	Corrosion and grounding systems
Week 13	Battery chemistry
Week 14	Sustainability and green materials
Week 15	Review and applied case studies
Week 16	Preparatory week before final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• A.J. Dekker – Electrical Engineering Materials • Dissado & Fothergill – Electrical Degradation and Breakdown in Polymers • Wadhwa – High Voltage Engineering • Selected IEEE / IEC technical reports	
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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**F –** Fail	راسب	(0-44)	Considerable amount of work required

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نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Signal Processing II** **معالجة الاشارة الرقمية II**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	EEC 414				
Number of Credit Hours (Total) / Number of Units (Total)	**3/2**				
Module Level		Fourth-E&C	**Semester of Delivery**		8
Administering Department		Department of Electrical Eng.	**College**	Engineering	
Module Leader	Dr.Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Dept.	**Module Leader's Qualification**		PhD
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Peer Reviewer Name		Dr. Saad Wasmi	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.1	

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	• To introduce advanced digital filter design methods for IIR and FIR systems. • To develop the ability to transform analogue filter specifications into digital filter realizations. • To analyze and implement common IIR and FIR filter structures used in practical DSP systems. • To explain the Discrete Fourier Transform (DFT) and its role in frequency-domain signal analysis. • To develop understanding of Fast Fourier Transform (FFT) algorithms, including Radix-2 and Radix-4 implementations. • To support practical DSP applications in communications, control, instrumentation, and embedded signal-processing systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the principles of analogue, IIR, and FIR filter design. 2. Design digital filters according to frequency-domain specifications. 3. Compare IIR and FIR filters in terms of stability, phase response, complexity, and implementation requirements. 4. Realize IIR filters using Direct Form I, Direct Form II, Direct Form II Transpose, cascade, parallel, poly-phase, and lattice structures. 5. Realize FIR filters using direct, poly-phase, and lattice structures. 6. Compute and interpret the Discrete Fourier Transform (DFT) for discrete-time signals. 7. Apply FFT algorithms for efficient spectral analysis using Radix-2 and Radix-4 methods. 8. Select appropriate DSP structures and algorithms for engineering applications.
Indicative Contents	**Part A - Analogue and Digital Filter Design**

المحتويات الإرشادية	Analogue filter design; digital filter specifications; IIR digital filter design; FIR digital filter design; comparison between IIR and FIR filters; practical design considerations. [18 hrs.] Revision and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part B - IIR and FIR Filter Structures** IIR filter structures including Direct Form I, Direct Form II, Direct Form II Transpose, cascade structure, parallel form structure, poly-phase and lattice structures. FIR structures including direct, poly-phase and lattice structures. [18 hrs.] Revision and tutorial classes [6 hrs.] Quizzes [1 hr.] **Part C - DFT and FFT Algorithms** Discrete Fourier Transform (DFT), frequency-domain interpretation, Fast Fourier Transform (FFT) algorithms, Radix-2 FFT, Decimation-in-Time and Decimation-in-Frequency FFT, and development of Radix-4 FFT algorithms. [18 hrs.] Revision and tutorial classes [6 hrs.] Quizzes [1 hr.]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	• Structured lectures to explain theoretical concepts and mathematical derivations. • Tutorial problem-solving sessions for filter design, DFT, and FFT calculations. • Software-based demonstrations using MATLAB or similar DSP tools. • Short assignments and reports to connect algorithms with practical communication and control applications. • Continuous feedback through quizzes, homework, and classroom discussions.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1/3	10	CONTINUES	1-2
	Assignments	1/3	5	CONTINUES	1-2

	CLASSWORK	1/1	5	CONTINUES	1-2
	Report	1/1	10	CONTINUES	1-2
Summative assessment	**Midterm Exam**	1.5/1	10	CONTINUES	1-2
	Final Exam	3/1	60	CONTINUES	1-2
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Review of DSP I concepts, discrete-time systems, and frequency-domain representation.
Week 2	Analogue filter design concepts and filter specifications.
Week 3	IIR digital filter design methods and frequency transformations.
Week 4	FIR digital filter design methods and window-based design.
Week 5	Comparison between IIR and FIR filters; stability and phase response.
Week 6	IIR structures: Direct Form I, Direct Form II, and Direct Form II Transpose.
Week 7	Midterm Exam / review of filter design.
Week 8	Cascade and parallel IIR structures.
Week 9	Poly-phase and lattice structures for IIR filters.
Week 10	FIR structures: direct, poly-phase, and lattice structures.
Week 11	Discrete Fourier Transform (DFT): definition, properties, and applications.
Week 12	Spectral analysis using DFT and computational complexity.
Week 13	Fast Fourier Transform (FFT): Radix-2 development.
Week 14	Decimation-in-Time and Decimation-in-Frequency FFT algorithms.
Week 15	Radix-4 FFT algorithms and practical DSP applications.
Week 16	Preparatory week before the final exam.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	Digital Signal Processing: Principles, Algorithms, and Applications – John G. Proakis and Dimitris G. Manolakis	
Recommended Texts	Discrete-Time Signal Processing – Alan V. Oppenheim and Ronald W. Schafer	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Computer interfacing systems** **نظم الوصل البيني**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEC 406**				
Number of Credit Hours (Total) / Number of Units (Total)	**3/2**				
Module Level		Fourth-E&C	**Semester of Delivery**		8
Administering Department		Department of Electrical Eng.	**College**	Engineering	
Module Leader	Dr.Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Dept.	**Module Leader's Qualification**		PhD
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Peer Reviewer Name		Dr. Saad Wasmi	**e-mail**	s.w.o.luhaib@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.1	

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	• To introduce students to computer interfacing systems and microprocessor-based design • To understand 8086 architecture and peripheral interfacing techniques • To develop skills in designing interfacing systems using standard ICs • To provide knowledge of serial and parallel communication systems • To introduce basic microcontroller concepts (8051)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, students will be able to: 1. Understand the architecture of the 8086 microprocessor 2. Interface peripheral devices such as 8255, ADC, DAC, and display units 3. Design interfacing systems for stepper motors and control applications 4. Apply interrupt and DMA techniques using 8259 and 8257 5. Implement serial communication using 8251 USART and RS-232 standards 6. Understand basic architecture and programming of 8051 microcontroller
Indicative Contents المحتويات الإرشادية	• 8086 Microprocessor architecture and operation • Peripheral interfacing: o 8255 Programmable Peripheral Interface o Display controllers o Stepper motor interfacing o A/D and D/A converters • Interrupt controller (8259) • DMA controller (8257) • Serial communication:

	○ RS-232 ○ Serial data transfer methods ○ 8251 USART • Parallel communication systems • Introduction to 8051 microcontroller: ○ Architecture ○ Memory organization ○ Addressing modes ○ Instruction set • Basic programming applications

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures and tutorials Problem-solving sessions Practical examples and interfacing design exercises Use of simulation tools and simple programming

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	10	CONTINUES	1-2
	Assignments	1/3	5	CONTINUES	1-2
	CLASSWORK	1/1	5	CONTINUES	1-2
	Report	1/1	10	CONTINUES	1-2
Summative assessment	Midterm Exam	1.5/1	10	CONTINUES	1-2
	Final Exam	3/1	60	CONTINUES	1-2
Total assessment			100		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week	**Material Covered**
Week 1	Introduction to Computer Interfacing Systems and Overview of 8086 Microprocessor
Week 2	8086 Architecture: Bus Interface Unit (BIU) and Execution Unit (EU)
Week 3	Memory Organization and Addressing Modes of 8086
Week 4	Peripheral Interfacing Fundamentals and 8255 PPI
Week 5	Display Interfacing and Stepper Motor Control
Week 6	A/D and D/A Converter Interfacing with 8086
Week 7	Midterm Exam
Week 8	Interrupt System and 8259 Programmable Interrupt Controller
Week 9	DMA Controller 8257 and Direct Memory Access Techniques
Week 10	Serial Communication Basics and RS-232 Standard
Week 11	8251 USART Architecture and Serial Interfacing
Week 12	Parallel Communication and Port Interfacing
Week 13	Introduction to 8051 Microcontroller Architecture
Week 14	8051 Programming and Applications
Week 15	Review and Practical Applications
Week 16	Final Exam Preparation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Walter A. Triebel, Avtar Singh, *The 8088 and 8086 Microprocessors: Programming, Interfacing, Software, Hardware, and Applications*, 4th Edition, Wiley, 2016.	
Recommended Texts	Barry B. Brey, *The Intel Microprocessors*, 8th Edition, Pearson, 2011.	
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.

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**CONTROL SYSTEMS II** **II نظم السيطرة**			**Module Delivery**	
Module Type	**Core learning activity**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**EEC 412**				
Number of Credit Hours (Total) / Number of Units (Total)	**4/3**				
Module Level		Fourth-E&C	**Semester of Delivery**		8
Administering Department		Department of Electrical Eng.	**College**	Engineering	
Module Leader	Dr.Omar Sh. Alyozbaky		**e-mail**	o.yehya@uomosul.edu.iq	
Module Leader's Acad. Title		Head of Dept.	**Module Leader's Qualification**		PhD
Module Tutor	Dr. Mohammed Obaid Mustafa		**e-mail**	mohammed.obaid@uomosul.edu.iq	
Peer Reviewer Name		Dr. Mohammed Obaid Mustafa	**e-mail**	mohammed.obaid@uomosul.edu.iq	
Scientific Committee Approval Date			**Version Number**	1.1	

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 this course is to provide students with a solid understanding of the **analysis, modeling, and design of control systems**. The course develops the ability to analyze system behavior, assess stability and performance, and design appropriate controllers for engineering applications. 8. Provide systematic methods for assessing **stability** using classical and modern techniques. 9. Equip students with the skills to **design and tune feedback controllers** (such as PID controllers) to meet given performance specifications. 10. Introduce students to **frequency-domain analysis tools**, including Bode plots, Nyquist plots, and root locus methods. 11. Introduce PID controller design techniques. 12. Enable students to **design and tune feedback controllers** to meet specified engineering requirements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**Analyze** system stability using classical stability criteria. **Evaluate** system performance in time and frequency domains using standard control techniques. **Design and tune** basic controllers (e.g., PID) to satisfy given performance specifications.
Indicative Contents المحتويات الإرشادية	**Week1-Week2: Stability of Linear Control Systems** • Concepts and types of stability in linear control systems • Relationship between pole locations and system stability • Methods for determining stability • Formulation of the Routh array • Stability conditions using the Routh–Hurwitz criterion • Special cases and interpretation of results **Week 3: State Feedback Design** • State-space representation of dynamic systems

	• Concept of state feedback control • Pole placement technique • Examples of MIMO systems **Week 4-Week 6: Root Locus Analysis** • Introduction to root locus technique • Basic properties and construction rules • Effect of system gain on pole locations • Performance improvement using root locus • Selection of appropriate gain values • Time-domain performance specifications • Worked examples of root locus analysis **Week 7: Midterm Examination** **Week 8 - Week 12: Frequency-Domain Analysis** • Introduction to frequency-domain methods • Nyquist stability concept • Relationship between frequency response and stability • Construction of Nyquist plots • Application of the Nyquist stability criterion • Analytical and design examples • Magnitude and phase plots • Frequency response characteristics • Gain and phase margins • Manual construction of Bode plots • Logarithmic approximation techniques

	• Interpretation of results **Week 13 – Week 15: Control System Design** • Systematic design procedure • Integration of time-domain and frequency-domain methods • Controller selection • Structure of PID controllers • Effect of proportional, integral, and derivative actions • Practical design considerations • Principles of Ziegler–Nichols tuning • Open-loop and closed-loop tuning methods
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Lectures** • Structured lectures introduce fundamental concepts, theories, and analytical techniques in control systems. • Emphasis is placed on conceptual understanding, mathematical formulation, and physical interpretation. **2. Problem-Solving Sessions** • Guided tutorials focus on solving numerical and analytical problems. • Students practice stability analysis, controller design, and performance evaluation. **3. Project-Based Learning** • Individual or group mini-projects involve modeling, analysis, and controller design for selected systems. **4. Self-Directed Learning** • Students are encouraged to engage in independent study through textbooks, research papers, and online resources. • Homework assignments and reading tasks support deeper understanding.

	5. Continuous Feedback • Regular formative feedback is provided through assignments, quizzes, and reports. • Feedback helps students identify strengths and areas for improvement.

Module Evaluation

تقييم المادة الدراسية

As		Time/ Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	1/3	10	CONTINUES	1-3
	Assignments	1/3	5	CONTINUES	1-2
	CLASSWORK	1/1	5	CONTINUES	1-3
	Report	1/1	10	CONTINUES	1-3
Summative assessment	Midterm Exam	1.5/1	10	CONTINUES	1-3
	Final Exam	3/1	60	CONTINUES	1-3
Total assessment			100		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered
Week 1	Stability of Linear Control Systems, Methods of Determining Stability
Week 2	Routh-Hurwitz Criterion
Week 3	Design of State feedback
Week 4	Root Locus Analysis, Basic Properties of the Root Loci (RL)
Week 5	Design Aspects of the Root Loci
Week 6	Root Locus Analysis and Examples

Week 7	**Exam**
Week 8	Frequency-Domain Analysis, Nyquist Stability concept
Week 9	Nyquist Stability – examples
Week 10	Boele Plot Analysis
Week 11	Stability Analysis with the Magnitude-Phase Plots
Week 12	Boele Plot Analysis With Logarithmic Graph Paper
Week 13	Design of Control System
Week 14	Design of PID Controller
Week 15	ziegler-nichols Method for Controller
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	7. Automatic Control Systems, (9th Edition), By: Golnaraghi and B. C. Kuo.	
Recommended Texts	8. Modern Control Engineering, (5th Edition), By: Katsuhiko Ogata. 9. Control Systems Engineering, (6th Edition) By: Norman S. Nise	
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
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