نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة .كلكامش

الكلية/ المعهد: كلية الهندسة

القسم العلمي: قسم هندسة الحاسوب

اسم البرنامج الأكاديمي او المهني: بكالوريوس

اسم الشهادة النهائية: بكالوريوس في هندسة الحاسوب

النظام الدراسي: بولونيا

تاريخ اعداد الوصف:

التوقيع :

اسم رئيس القسم:

التاريخ :

التوقيع :

اسم المعاون العلمي:

التاريخ :

دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي:

التاريخ ١٤/ ٨/ ٢٠٢٥

التوقيع

مصادقة السيد العميد

1. رؤية البرنامج

رؤيتنا هي تعزيز بيئة يزدهر فيها التميز في مجال هندسة الحاسوب على المستويين المحلي والإقليمي، من خلال توفير بيئة تعليمية وبحثية مبتكرة تُسهم في تطوير المعرفة التقنية وتعزيز مهارات الإبداع والابتكار لدى الطلبة. كما يطمح القسم إلى إعداد مهندسين يمتلكون كفاءة عالية في مجالات البرمجة، الذكاء الاصطناعي، نظم المعلومات، وشبكات الحاسوب، بما يتوافق مع متطلبات سوق العمل ويساهم في خدمة المجتمع ودعم مسيرة التحول الرقمي والتنمية المستدامة حيث يعتبر هذا الجيل من المهندسين هم قادة المستقبل والذين سيقودون كل جوانب التكنولوجيا المتقدمة .

2. رسالة البرنامج

مهمتنا هي تمكين الطلاب في قسم هندسة الحاسوب من التعليم المفاهيم الاساسية في مجال التكنولوجيا من اجل تعزيز مهاراتهم في الجوانب العلمية والعملية التي تمكنهم من اجراء بحوث متقدمة وابتكار أفكار جديدة من اجل تعزيز احتياجات التطور التي يحتاجها سوق العمل .

3. اهداف البرنامج

أهداف قسم هندسة الحاسوب الاستراتيجية في كلية الهندسة / جامعة كلكامش . بعد اجتياز الطالب المراحل الدراسية الأربعة , ان يكون الخريج :

- توفير تعليم فعال وشامل بعد الطلاب لمهن ناجحة في مجال الهندسة
- أجراء أبحاث عالية التأثير تعمل على تطوير المعرفة وتلبية الاحتياجات المجتمعية الحرجة.
- تعزيز التنوع والمساواة والشمول داخل المجتمع الهندسي
- التعاون مع شركاء الصناعة وأصحاب المصلحة لأنشاء تعاون وفرص هادفة للطلاب وأعضاء هيئة التدريس.
- المساهمة في تطوير التقنيات والممارسات المستدامة التي تعود بالنفع على المجتمع والبيئة.
- تهيئة خريجين يمتلكون الامكانية العلمية والعملية في مجال هندسة الحاسوب .
- تهيئة كوادر هندسية مهنية ومتطورة قادرة على تصميم انظمة وبرامج الحاسوب و تحليلها و تطويرها .
- تعزيز التعليم المستمر والتطوير المهني لدى الخريجين
- تحفيز الخريجين للمشاركة في الجمعيات المهنية وخدمة المجتمع

4. الاعتماد البرامجي

في إطار سعي قسم هندسة الحاسوب في كلية الهندسة جامعة كلكامش فإن القسم في طور استكمال المتطلبات للحصول على الاعتماد البرامجي

5. المؤثرات الخارجية الأخرى

سوق العمل الزيارات العلمية والميدانية للدوائر الحكومية والشركات ذات العلاقة, المجلس الاستشاري الصناعي في كلية الهندسة

6. هيكلية البرنامج

هيكل البرنامج	عدد المقررات	وحدة دراسية	النسبة المئوية	ملاحظات *
متطلبات المؤسسة	9	18	%15.5	
متطلبات الكلية	10	20	%17.2	
متطلبات القسم	39	78	%67.2	
التدريب الصيفي				
أخرى				

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

7. وصف البرنامج : مسار بولونيا

السنة / المستوى	رمز المقرر أو المساق	اسم المقرر أو المساق	الساعات المعتمدة	
			نظري	عملي
المرحلة الاولى/ كورس اول	COE11301	الرياضيات 1	2	
المرحلة الاولى/ كورس اول	COE11302	الرسم الهندسي	2	
المرحلة الاولى/ كورس اول	COE11303	منهجية برمجة الحاسوب	2	2
المرحلة الاولى/ كورس اول	COE11304	أساسيات النظام الرقمي	2	2
المرحلة الاولى/ كورس اول	GU13	اللغة الإنكليزية 1	2	
المرحلة الاولى/ كورس اول	COE11305	أساسيات الدوائر الكهربائية 1	2	2
المرحلة الاولى/ كورس اول	GU11	الديمقراطية وحقوق الإنسان	2	
المرحلة الاولى/ كورس ثاني	COE12302	فيزياء الكترونية	2	2

المرحلة الاولى/ كورس ثاني	COE12301	الرياضيات 2	3	
المرحلة الاولى/ كورس ثاني	COE12303	الورشة		2
المرحلة الاولى/ كورس ثاني	COE12304	أساسيات تركيب الحاسوب	2	2
المرحلة الاولى/ كورس ثاني	COE12305	أساسيات الدوائر الكهربائية 2	2	2
المرحلة الاولى/ كورس ثاني	GU12	اللغة العربية 1	2	
المرحلة الثانية كورس اول	GU24	جرائم نظام البعث في العراق	2	
المرحلة الثانية كورس اول	COE21301	البرمجة الشيئية	2	2
المرحلة الثانية كورس اول	COE21302	الرياضيات الهندسية	2	2
المرحلة الثانية كورس اول	COE21303	أساسيات الاتصالات 1	2	2
المرحلة الثانية كورس اول	COE21304	تصميم النظم الرقمية 1	2	2
المرحلة الثانية كورس اول	COE21306	إلكترونيك 1	2	2
المرحلة الثانية كورس ثاني	COE22301	تحليلات هندسية	2	2
المرحلة الثانية كورس ثاني	COE22302	إلكترونيك 2	2	2
المرحلة الثانية كورس ثاني	COE22303	أساسيات الاتصالات 2	2	2
المرحلة الثانية كورس ثاني	COE22304	تصميم النظم الرقمية 2	2	2
المرحلة الثانية كورس ثاني	COE22305	نظم التشغيل	4	
المرحلة الثانية كورس ثاني	GU22	اللغة الانكليزية 2	2	
المرحلة الثانية كورس ثاني	GU21	اللغة العربية 2	2	
المرحلة الثانية كورس ثاني	COE22306	هياكل البيانات والخوارزميات	2	2

1.مخرجات التعلم المتوقعة للبرنامج	
المعرفة	
مخرجات التعلم	**بيان نتائج التعلم**
اكتساب المعرفة الأساسية والتي تتضمن البرنامج توفير فهم عميق وشامل لجميع مفاهيم والمبادئ الأساسية لهندسة الحاسوب بما في ذلك المفاهيم الاساسية	– فهم مفاهيم ومبادئ الاساسية لهندسة الحاسوب مثل البرمجة وهياكل البيانات والخوارزميات – القدرة على تحليل المشاكل البرمجية وتطوير حلول باستخدام المفاهيم المكتسبة

للرياضيات والبرمجة وهياكل البيانات والخوارزميات	
2. فهم الإشارات الرقمية : يتضمن البرنامج دراسة الإشارات الرقمية وتحليلها وتطبيقاتها في مجالات مختلفة مثل معالجة الإشارات الرقمية والاتصالات الرقمية	– القدرة على تحليل الإشارات وفهم اليات تحويل الإشارات بين أنظمة التمثيل المختلفة – التمكن من تصميم وتنفيذ الخوارزميات الرقمية لمعالجة الإشارات والبيانات
3– معرفة مبادئ شبكات الحاسوب: يتناول البرنامج دراسة شبكات الحاسوب بدءا من مفاهيم الشبكات الأساسية وانتهاء بتصميم وإدارة الشبكات بمافي ذلك توصيل الأجهزة وتشخيص وحل المشكلات	– فهم جميع المفاهيم الأساسية لشبكات الحاسوب وبروتكولات الاتصال التي تستخدم في الشبكات وكذلك كيفية عمل حماية للشبكة – التمكن من تصميم وتكوين وإدارة الشبكات وحل المشكلات التقنية المتعلقة بها
4–لغات البرمجة : يتيح البرنامج للطلاب فرصة التعرف على مجموعة متنوعة من لغات البرمجة وفهم كيفية استخدامها وتطبيقها في تطوير البرمجيات وحل المشاكل الهندسية	– اكتساب المهارات في استخدام لغات البرمجة المختلفة والتي تعتبر الأساسية في تطبيق البرامج العملية لبيئة العمل مثل , java, C++ > python ولغات تصميم الويب وغيرها – القدرة على تطوير التطبيقات البرمجية وحل المشاكل التي ممكن يوجهها في البرمجة بطريقه سهله وسريعة
المهارات	
مخرجات التعلم	**نتائج التعلم**
تطوير مهارات صياغة والعمل على بناء تطبيقات برمجية متطورة يمكن الاستفادة منها في الحياة العملية وذلك من خلال استخدام لغات البرمجة المتطورة التي تخدم التطبيقات الحديثة	– يتمكن الطلاب من اكتساب مهارات تصميم وتطوير التطبيقات البرمجية بشكل مستقل مما يمكنهم من انتاج حلول برمجية مبتكرة لمختلف التحديات التقنية.
اكتساب المهارات الازمة لتشخيص وصيانة الاجهزة الحاسوبية بفعالية	– يكتسب الطلاب القدرة على تحليل وحل المشاكل التقنية في الاجهزة الحاسوبية بشكل فعال، مما يساهم في زيادة كفاءة وفاعلية الانظمة التقنية
تصميم وتكوين وصياغة الشبكات والانظمة الحاسوبية وربط الدوائر الكهربائية	– يكتسب الطلاب المعرفة والمهارات اللازمة لتصميم وادارة الشبكات الحاسوبية بشكل متقدم , مما يساعدهم في بناء بنية تحتية تقنية متطورة وأمنة
تطوير وتنفيذ حلول لمعالجة الاشارات الرقمية باستخدام اساليب متقدمة	يتمكن الطلاب من تطبيق مفاهيم وتقنيات معالجة الاشارات الرقمية في حل مجموعة متنوعة من المشاكل التقنية، مما يعزز قدرتهم على تطوير حلول مبتكرة وفعالة في هذا المجال
القيم	

مخرجات التعلم	نتائج التعلم
تعزيز الابداع والابتكار حيث يهدف البرنامج الى زرع روح الابداع والتحفيز على أيجاد حلول مبتكرة للتحديات المختلفة في مجال هندسة الحاسوب	زرع روح الابداع والابتكار لدى الطلاب وتنمية مهاراتهم في ايجاد حلو مبتكرة
تطوير مهارات العمل الجماعي حيث يسعى البرنامج الى تعزيز قدرة الطلاب على العمل كفرق جماعية فعالة مما يسهم في تحقيق مخرجات مميزة وفعالة	تطوير قدرات العمل الجماعي للطلاب مما يؤدي الى تحقيق مخرجات مميز
تحفيز المسؤولية الاجتماعية حيث يهدف البرنامج الى تنمية الشعور بالمسؤولية لدى الطلاب وتهيئتهم نفسيا لتحمل المسؤولية في مجتمع العمل والمجتمع بشكل عام	تعزيز المسؤولية الاجتماعية والتحمل المسؤولية في المجتمع والعمل
تعزيز قيم الحرص والمثابرة حيث يركز البرنامج على تنمية فهم الحرص والمثابرة لدى الطلاب مما يعزز ارادتهم للوصول الى نتائج مرضية وتحقيق النجاح في مساراتهم الاكاديمية والمهنية	تعزيز قيم الحرص والمثابرة مما يساهم في تحقيق النجاح الاكاديمي والمهني

1. استراتيجيات التعليم والتعلم

1. الشرح والتوضيح عبر المحاضرات حضوريا والكترونيا .
2. عرض المواد العلمية باستخدام أجهزة العرض المتنوعة
3. التعلم الذاتي من خلال الواجبات المنزلية والمشروعات الصغيرة
4. استخدام المختبرات في التعلم والتطبيق العملي
5. أنجاز مشاريع التخرج كجزء من تجربة التعلم
6. الاستفادة من الزيارات العلمية للمواقع ذات الاهتمام
7. حضور السمنارات العلمية التي تعقد في القسم
8. أتاحه فرص التدريب الصيفي لتطوير المهارات العلمية

2. طرائق التقييم

1-اختبارات الفهم القصيرة (كوز)

2-الواجبات المنزلية

3. الهيئة التدريسية						
أعضاء هيئة التدريس						
الرتبة العلمية	التخصص		المتطلبات/المهارات الخاصة (ان وجدت)		اعداد الهيئة التدريسية	
	عام	خاص			ملاك	محاضر
جعفر علي جعفر	هندسة الاتصالات	هندسة النظم الضوئية			ملاك	
حنين جمهور صبار	هندسة معلومات	هندسة شبكات			ملاك	
اية عبدالرحمن كاظم	هندسة الطاقة	هندسة الطاقة			ملاك	
حوراء احمد جاسم عريبي	هندسة المعلومات	هندسة المعلومات والاتصالات			ملاك	

التطوير المهني
توجيه أعضاء هيئة التدريس الجدد
1-تقديم توجيه شامل حول طبيعة العمل والأهداف والقيم الإيمانية للمؤسسة والقسم 2-توفير دورات تدريبية متخصصة تشمل أساليب التدريس المبتكرة وأفضل الممارسات الأكاديمية 3-توجيه الهيئة التدريسية حول سياسات وإجراءات المؤسسة والقسم, بما في ذلك الأخلاقيات البحثية ومعايير الجودة. 4-توفير فرص للتواصل مع الزملاء والمشاركة في نشاطات البحث والتطوير المهني. 5-متابعة أداء الهيئة التدريسية الجديدة وتقديم الدعم والتوجيه الإضافي حسب الحاجة
التطوير المهني لأعضاء هيئة التدريس
1. تقديم دورات تدريبية متخصصة في استراتيجيات التدريس الفعالة وتكنولوجيا التعليم الحديثة. 2. توفير ورش عمل لتبادل الخبرات والممارسات الأفضل في مجال التدريس وتطبيقها في الصف. 3. إجراء تقييم دوري لأداء الهيئة التدريسية ونتائج التعلم لتحسين العملية التعليمية.

4. تعزيز المشاركة في برامج التطوير المهني المستمرة مثل الندوات ودورات العمل والمؤتمرات الأكاديمية.
5. دعم البحث والنشر الأكاديمي لتطوير الكفاءة الأكاديمية لأعضاء هيئة التدريس.
6. توفير فرص للتواصل والتعاون مع الهيئة التدريسية في مجالات الاهتمام المشترك
7. تقديم برامج خاصة لتطوير مهارات الإدارة الأكاديمية والقيادية.

4. معيار القبول

يكون الالتحاق بالكلية عن طريق القبول المركزي بالنسبة للدراسة الصباحية:

- المعدل: لا يقل عن 61% (لخريجي الدراسة الاعدادية–علمي,تطبيقي,احيائي)
- المعدل: لا يقل عن 64%(لخريجي الدراسة المهنية–الحاسوب, تكنولوجيا معلومات, الحاسوب وتقنية المعلومات وصيانة الحاسوب ,شبكات الحاسوب, والهاتف المحمول ,والإدارة الالكترونية)
- أما بالنسبة إلى الدراسة المسائية فيكون القبول عن طريق التقديم المباشر:
- المعدل: لا يقل عن 60% (لخريجي الدراسة الاعدادية–علمي,تطبيقي,احيائي)
- المعدل: لا يقل عن 60%(لخريجي الدراسة المهنية–الحاسوب, تكنولوجيا معلومات, الحاسوب وتقنية المعلومات وصيانة الحاسوب ,شبكات الحاسوب, والهاتف المحمول ,والإدارة الالكترونية)

- العمر: غير محدد

5. أهم مصادر المعلومات عن البرنامج

1. مواقع الجامعات الالكترونية المحلية والدولية
2. ورش العمل المنظمة من قبل وزراه التعليم العالي ومعايير الجودة الخاصة بها
3. دليل المجلس العراقي لاعتماد التعليم الهندسي
4. IEEE Computer Engineering Body of Knowledge

6. خطة تطوير البرنامج

1. تحليل الاحتياجات: أجراء استطلاعات واستطلاعات لتحديد احتياجات سوق العمل وتوجيهات الصناعة واستقصاء أراء الطلاب والهيئة التدريسية بخصوص نقاط القوة والضعف في البرنامج الحالي

2. تحديث المناهج: تطوير مناهج تعليمية حديثة تتماشى مع التطورات التكنولوجية الحديثة واحتياجات سوق العمل بما في ذلك أضافة مقررات جديدة وتحديث المقررات القادمة.
3. تعزيز التفاعلية: ادماج وسائل تعليمية تفاعلية مثل المختبرات الافتراضية والمشاريع العلمية ورش العمل لتعزيز تجربة التعلم وتطبيق المفاهيم النظرية في مشاريع عملية.
4. التركيز على المهارات العلمية : تطوير برامج تدريبة تركز على التنمية المهارات العلمية للطلاب مثل البرمجة وتصميم الانظمة وادارة المشاريع بالإضافة الى تعزيز مهارات الاتصال والعمل الجماعي.
5. تعزيز البيئة التعليمة : تحسين بنية التحتية التقنية وتوفير الموارد الازمة وتعزي التفاعل بين الطلاب والهيئة التدريسية من خلال المنتديات الافتراضية والندوات والمحاضرات الجماعية
6. متابعة وتقييم أنشاء اليات لمتابعة وتقيم أداء البرنامج الدراسي وتحليل البيانات الطلاب ومدى تحقيقهم لأهداف التعلم مما يمكن من أتخاذ للتدابير اللازمة لتحسين البرنامج
7. التعاون مع الصناعة بناء شراكات والمؤسسات الصناعية لتوجيه وتطوير البرنامج الدراسي وتوفير فرص التدريب والتوظيف للطلاب.
8. التحديث المستمر : أجراء استعراض دوري وتحديثات للبرنامج الدراسي بناء على تغيرات السوق والتكنولوجيا واحتياجات الصناعة لضمان استمرارية توفير تعليم ذو جودة عالية ومتميزة

مخطط مهارات البرنامج

السنة / المستوى	رمز المقرر	اسم المقرر	اساسي أم اختياري	مخرجات التعلم المطلوبة من البرنامج											
				المعرفة				المهارات				القيم			
				أ1	أ2	أ3	أ4	ب1	ب2	ب3	ب4	ج1	ج2	ج3	ج4
المرحلة الاولى/ كورس اول	COE11301	الرياضيات 1	اساسي	●				●				●			
المرحلة الاولى/ كورس اول	COE11302	الرسم الهندسي	اساسي	●				●				●	●	●	●
المرحلة الاولى/ كورس اول	COE11303	منهجية برمجة الحاسوب	اساسي	●	●		●	●	●			●	●		●
المرحلة الاولى/ كورس اول	COE11304	أساسيات النظام الرقمي	اساسي	●	●				●	●		●			
المرحلة الاولى/ كورس اول	GU13	اللغة الإنكليزية 1	اساسي	●				●				●	●	●	●
المرحلة الاولى/ كورس اول	COE11305	أساسيات الدوائر الكهربائية 1	اساسي	●	●				●	●	●	●	●	●	●

المرحلة الاولى/ كورس اول	GU11	الديمقراطية وحقوق الإنسان	اساسي																●
المرحلة الاولى/ كورس ثاني	COE12302	فيزياء الكترونية	اساسي	●	●				●	●	●	●	●	●	●	●	●	●	●
المرحلة الاولى/ كورس ثاني	COE12301	الرياضيات 2	اساسي	●				●				●							
المرحلة الاولى/ كورس ثاني	COE12303	الورشة	اساسي	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
المرحلة الاولى/ كورس ثاني	COE12304	أساسيات تركيب الحاسوب	اساسي	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
المرحلة الاولى/ كورس ثاني	COE12305	أساسيات الدوائر الكهربائية 2	اساسي	●	●				●	●	●	●	●	●	●	●	●	●	●
المرحلة الاولى/ كورس ثاني	GU12	اللغة العربية 1	اساسي													●	●	●	●
المرحلة الثانية كورس اول	GU24	جرائم نظام البعث في العراق	اساسي	●	●				●							●	●	●	
المرحلة الثانية كورس اول	COE21301	البرمجة الشيئية	اساسي	●	●				●	●	●	●		●	●	●	●	●	
المرحلة الثانية كورس اول	COE21302	الرياضيات الهندسية	اساسي	●		●	●	●	●	●	●			●	●	●		●	●

المرحلة الثانية كورس اول	COE21303	أساسيات الاتصالات 1	اساسي	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
المرحلة الثانية كورس اول	COE21304	تصميم النظم الرقمية 1	اساسي	●			●	●			●	●	●	●		●	●	●	●
المرحلة الثانية كورس اول	COE21306	إلكترونيك 1	اساسي								●			●		●	●	●	●
المرحلة الثانية كورس ثاني	COE22301	تحليلات هندسية	اساسي	●										●		●	●	●	●
المرحلة الثانية كورس ثاني	COE22302	إلكترونيك 2	اساسي	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●
المرحلة الثانية كورس ثاني	COE22303	أساسيات الاتصالات 2	اساسي	●	●				●			●	●			●	●		
المرحلة الثانية كورس ثاني	COE22304	تصميم النظم الرقمية 2	اساسي	●	●			●	●	●		●	●		●	●	●	●	
المرحلة الثانية كورس ثاني	COE22305	نظم التشغيل	اساسي	●		●	●	●	●	●	●	●	●		●	●	●		●
المرحلة الثانية كورس ثاني	GU22	اللغة الانكليزية 2	اساسي	●	●	●		●	●	●		●	●	●	●	●	●	●	●
المرحلة الثانية كورس ثاني	GU21	اللغة العربية 2	اساسي	●				●	●	●		●	●	●	●	●	●	●	●
المرحلة الثانية كورس ثاني	COE22306	هياكل البيانات والخوارزميات	اساسي		●	●		●	●	ر	●	●	●			●			

نماذج وصف المقررات
لقسم هندسة الحاسوب
2025-2024

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	***Computer programming methodology***			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**COE11303**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		computer engineering	**College**	College of engineering	
Module Leader	**Jannat.t.fanoos**		**e-mail**	**Jannat.t.fanoos@gu.edu.iq**	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		=
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/2/2025**		**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 Objectives أهداف المادة الدراسية	The main objectives of this course are to introduce the student the basic programming techniques by learning the C++ programming language. Then, start with the skills of writing the program and designing and implementing algorithms to solve the problem. The course gives an introduction to programming in C++ and includes topics such as: • Overview of Computers and Programming. • Introduction to Problems and Algorithms. • Problem-Solving Methodology. • Flowcharts, Decomposition outline, and Pseudo-code. • C++ Programming Basics (data types, operators and expressions, keywords and identifiers, variables and assignment, basic input/output routines). • Operators and Operations (Arithmetic Operators, Relational Operators, Logical Operators, Operators Precedence in C++, Bitwise Operators, Assignment Operators, and Casting Operators) • Math Operations in C++. • Input and Output statements. • Iteration (Loop) Statements. • Control Structures (sequence, selection [if, if\else, switch], iteration [for, while, do/while]), break and continue statements. • Arrays One dimension (1D), two dimensions (2D). • Learn how to create simple functions with different types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	By the end of this course, the students will be able to do the following: 1. State the basic parts of any computer system and explain them. 2. Demonstrate the differences between various parts of the computer system (like RAMs and ROMs, Input / outputs, buses) and others. 3. Identify variables and constants and apply them in statements in the program. 4. Work with input output functions to inquire data from keyboard and display them on the monitor. 5. Deal with various mathematical and logical operations inside the program. 6. Construct flowcharts for solving different problems and presenting solutions. 7. Include many libraries in the programs that require extra functionalities. 8. be able to use conditional statements like (if, case,...) in the program and how to use them in various conditions. 9. Implement repetitive structures like (for) and how to utilize it inside the program. 10. Use the (while, do while) structures as an alternative for (for). 11. Write the syntax for identifying array and how to identify them in a program. 12. Understand the principle of indexing and how to manipulate indices throughout the program. 13. Write custom functions in the program and how to identify and use a new function by the user. 14. Provide learners with an understanding of how to read, write, and process array elements and functions in C++ and create new functions with return values and calls.

Indicative Contents المحتويات الإرشادية	1. Introduction to Programming: Basics of programming languages, program structure, variables, data types, operators, control structures (conditionals, loops), functions, and basic input/output. 2. Object-Oriented Programming (OOP): Concepts of objects, classes, inheritance, polymorphism, encapsulation, and abstraction. Implementation of OOP principles using a specific programming language. 3. Software Development Life Cycle (SDLC): Overview of the different phases of software development, including requirements gathering, analysis, design, implementation, testing, deployment, and maintenance. Introduction to methodologies such as waterfall, agile, and iterative development. 4. Algorithms and Data Structures: Introduction to fundamental algorithms and data structures, such as arrays, linked lists, stacks, queues, trees, graphs, sorting, searching, and complexity analysis. Design and implementation of algorithms and data structures. 5. Software Testing: Principles and techniques of software testing, including unit testing, integration testing, system testing, and acceptance testing. Test case design, test-driven development (TDD), and debugging strategies. 6. Version Control Systems: Introduction to version control concepts and tools such as Git. Working with repositories, branching, merging, and resolving conflicts. Collaborative development practices. 7. Software Design Principles: Principles and patterns for software design, including SOLID (Single Responsibility, Open-Closed, Liskov Substitution, Interface Segregation, Dependency Inversion), design patterns (e.g., Factory, Singleton, Observer), and architectural patterns (e.g., MVC, MVP, MVVM). 8. Software Documentation and Code Organization: Writing clear and effective code documentation. Best practices for code organization, naming conventions, and code modularity. 9. Debugging and Error Handling: Techniques for identifying and resolving software bugs. Strategies for error handling and exception management. 10. Software Development Tools: Introduction to integrated development environments (IDEs), code editors, and other tools used in the software development process.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this course, attendance is one of the mandatory tasks for students, since the key idea behind each topic the subject would be given during the lab. Also, assignments play an important role in keeping track of comprehending all the skills and problem-solving methods for topics. Exams are the true criterion for measuring the depth of students' understanding to the given material.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #3, #4,#6, #7, #9 and #14,
	Assignments	2	10% (10)	2 and 12	LO #7, #8, #9, #10, #12 and #14.
	Report	1	10% (10)	13	LO #6, #9, #11 and #13.
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1-#10
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Computers and their uses/ Hardware/Software, Programming languages/How to use/ run programs.
Week 2	Using computers in problem solving/ requirement specifications/ analysis.
Week 3	Design and representation of algorithms/ implementation / testing and verification/ program documentation.
Week 4	Input and output/ data types.
Week 5	Arithmetic and logical operators, precedence of operators.
Week 6	C++ program control and structured programming Selections, If statement, nested if statement, if-else if ladder else.
Week 7	Switch-case statements, nested switch-case statement.

Week 8	Mid-course Exam
Week 9	Counter controlled and sentinel-controlled repetition.
Week 10	The do-while and while loops.
Week 11	Skipping loop iterations break and continue and exit() function..
Week 12	Labels and goto statement, nested loops.
Week 13	Using the array data structure to represent lists and tables of values, One-dimensional array creation, initialization and processing.
Week 14	Two-dimensional array creation, initialization and processing.
Week 15	Functions in C++, New Function Creation, Return Values, and Call.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Create a C++ project
Week 2	Lab 2: Variables and Data Types
Week 3	Lab 3: Operators and Operations
Week 4	Lab 4: Input and Output statements
Week 5	Lab 5: Iteration (Loop) Statements
Week 6	Lab 6: Loop Control Statements and Decision-Making statements
Week 7	Lab 7: Create simple functions with different types

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Deitel, P and Deitel H, C++ How to Program, 8th Edition, Prentice Hall 2012.	No
Recommended Texts	1. Bradley, A, Programming for Engineers, Springer, 2011. 2. Bronson, G, C for Engineers and Scientists, West Publishing Company, 1993.	No
Website	https://www.w3schools.com/cpp/default.asp	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Electrical Circuits I**			**Module Delivery**	
Module Type				☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**COE11305**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	**safaa kamel**		**e-mail**	**safaa.k.burhan@gu.edu.iq**	
Module Leader's Acad. Title	**Ass.lecturer**		**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	**1/2/2025**		**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 Objectives أهداف المادة الدراسية	1. Understand the fundamental concepts of electric circuits, including voltage, current, resistance, and power, and their relationships as defined by Ohm's law. 2. Analyze and solve basic DC circuits using techniques such as series and parallel circuit analysis, voltage division, and current division. 3. Apply Kirchhoff's laws (Kirchhoff's current law and Kirchhoff's voltage law) to analyze and solve complex DC circuits. 4. Calculate the equivalent resistance of resistors in series and parallel configurations and apply this knowledge to simplify complex resistor networks. 5. Analyze circuits using various circuit analysis techniques, such as nodal analysis and mesh analysis, to determine voltage, current, and power relationships. 6. Apply important circuit theorems, such as the superposition theorem, Thevenin's theorem, and Norton's theorem, to simplify complex DC circuits and calculate unknown quantities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of basic electrical concepts: Students should gain a solid understanding of fundamental electrical concepts such as voltage, current, resistance, and power. They should be able to apply Ohm's law and solve basic electrical circuit problems using these concepts. 2. Analysis of DC circuits: Students should be able to analyze and solve DC circuits using techniques such as Kirchhoff's laws, nodal analysis, and mesh analysis. They should be able to calculate voltage drops, current flows, and power dissipation in different parts of a circuit. 3. Circuit components and their behavior: Students should learn about various circuit components such as resistors, and understand their behavior in DC circuits. They should be able to calculate the equivalent resistance of resistors in series and parallel. 4. Circuit theorems: Students should be familiar with important circuit theorems such as the superposition theorem, Thevenin's theorem, and Norton's theorem. They should be able to apply these theorems to simplify complex DC circuits and calculate unknown quantities. 5. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex DC circuits to determine voltage, current, and power relationships. 6. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Electric Circuits: [15Hours] - Basic concepts of voltage, current, resistance, and power - Circuit elements: resistors, capacitors, and inductors - Circuit diagrams and symbols 2. Ohm's Law and DC Circuit Analysis: [15Hours] - Ohm's law and its applications

	- Series and parallel circuits - Voltage and current division - Power calculations in DC circuits 3. Equivalent Resistance and Circuit Simplification: [15Hours] - Equivalent resistance in series and parallel circuits - Voltage and current division using equivalent resistances - Circuit simplification techniques 4. Kirchhoff's Laws and Circuit Analysis Techniques: [15Hours] - Kirchhoff's current law (KCL) and Kirchhoff's voltage law (KVL) - Nodal analysis and mesh analysis 5. Circuit Analysis using Circuit Theorems: [15Hours] - Application of superposition theorem - Thevenin's theorem and Norton's theorem - Maximum power transfer theorem 6. Review and Assessment: [5Hours] - Review of key concepts and techniques - Practice problems and exercises - Summative assessments (quizzes, tests, or exams)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Electrical circuit, electrical current, voltage difference, notations
Week 2	Basics of Network Elements- Types of voltages, types of currents, power and energy
Week 3	Resistors and resistivity, Conductance, and Conductivity
Week 4	Ohm's law, and Temperature effect
Week 5	Series and parallel circuits,
Week 6	Delta -star , and star - delta transformation, Kirchhoff's laws.
Week 7	Mesh current analysis
Week 8	Mid-course Exam
Week 9	Branch current method
Week 10	Sources transformation
Week 11	Node voltage analysis
Week 12	Super-position circuit analysis theorem
Week 13	Thevinon’s theorem
Week 14	Norton theorem
Week 15	Maximum power transfer
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Basic information and ohm's law
Week 2	Lab 2: Series and parallel circuits
Week 3	Lab 3: Voltage and Current divider
Week 4	Lab 4: Delta-Star connection
Week 5	Lab 5: Mesh and Nodal
Week 6	Lab 6: Superposition, Thevinen, and Norton theorems
Week 7	Lab 7: Maximum Power Transfer

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Introductory circuit Analysis; by Robert L. Boylestad	Yes
Recommended Texts	Sadiku, Matthew NO, and Charles K. Alexander. Fundamentals of electric circuits. New York: McGraw-Hill, 2009.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering drawing**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11302				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		computer engineering	**College**	College of engineering	
Module Leader	**Aya A kadim**		**e-mail**	**aya.a.kadhim@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/2/2025**		**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 Objectives أهداف المادة الدراسية	1. The aim of this module is to provide students with a comprehensive understanding of engineering drawing principles and techniques. It aims to develop their skills in creating and interpreting technical drawings, which are essential in the field of engineering. The module also aims to enhance students' spatial visualization abilities and their understanding of the relationship between 2D representations and 3D objects. 2. Describing the AutoCAD program and Its icons, knowing what's new in AutoCAD version. 3. The students will have skills to use that's program and drawing any things (2D). 4. Reading plans of projects . 5. How to make show for them projects . 6. Auto desk AutoCAD software provide powerful ,integrated 2D modeling, drawing ,and layers tools that enable designers to focus more energy on creative ,rather than technical challenges
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate an understanding of the principles and conventions of engineering drawing. 2. Apply appropriate techniques to create accurate and precise engineering drawings. 3. Interpret and analyze technical drawings, including dimensions and annotations. 4. Learn drawing skills by AutoCAD . 5. Learn to read construction plans by AutoCAD . 6. Increase the student's imagination by AutoCAD .
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. <u>Introduction to Engineering Drawing</u> Importance of engineering drawing in the design and manufacturing process.

	Standards and conventions in engineering drawing. Types of technical drawings: orthographic projections, isometric projections, etc. 2. Drawing Instruments and Techniques Overview of drawing instruments and their uses Sketching techniques and line types Scaling, dimensioning, and labeling 3. Orthographic Projections Principles of orthographic projection Multi view drawings Sectional views and conventions 4. Isometric Projections Introduction to isometric projections Isometric drawing techniques and isometric scales Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing. 5. Creating and Modifying Components by AutoCAD. 6. Modeling and Modifying Elements by AutoCAD.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	In this module, a combination of project-based learning, lectures, and group discussions will be utilized to create an engaging learning environment. Students will apply engineering drawing principles and techniques to real-world scenarios, participate in interactive lectures using visual aids and examples, collaborate in group discussions to analyze and problem-solve, engage in practical exercises and workshops to develop technical drawing skills with traditional tools and CAD software, and conduct independent study.

Student Workload (SWL) الحمل الدراسي 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

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	12	15% (15)	Continuous	All
	Assignments	12	20% (20)	Continuous	All
	Projects / Lab.	3	5% (5)	12,13,14 and 15	
	Report				
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Principle of engineering drawing
Week 2	Sketching techniques and line types & Scaling, dimensioning, and labeling
Week 3	Principles of orthographic projection
Week 4	Multiview drawings in orthographic projection
Week 5	Sectional views and conventions
Week 6	Introduction to isometric projections
Week 7	Isometric drawing techniques and isometric scales

Week 8	Isometric views of objects and assemblies Extracting 2D Drawings form Isometric drawing
Week 9	Mid exam
Week 10	1- Introduction - Theory lectures on history of AutoCAD program, what's new versions, how to install program. 2- Explanation the main window for program, how to arrange it before start work.
Week 11	how to use file icon from the window(open,new,save ,save as,export,merge ,drawing properties .draw orders(line and construction line with types of lines (hidden and center lines)) and modify (erase,move,copy) Orthogonally ,snaps, grid, scale and explode .
Week 12	Draw Arcs,polyline,circles and rectangle Draw Ellipses ,trim and extend orders , rotate and mirror.
Week 13	term Exam + tutorial. And Application of previous orders. Layer order (how to change color,name,type and thickness of line by layer)
Week 14	Explanation of construction and architectural plans and types of lines(showing examples) and Application of previous orders.
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 10	Introduction - Theory lectures on history of AutoCAD program
Week 11	draw orders(line and construction line with types of lines (hidden and center lines)
Week 12	Layer order (how to change color,name,type and thickness of line by layer)
Week 13	Explanation of construction and architectural plans and types of lines

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1-Manual of engineering drawing - Simmons C.H., Maguire D. E. 2-Autodesk AutoCAD 2021: Learn CAD With Ease (For Beginners) Hardcover – February 20, 2021 by Madhumita Kshirsagar.	no
Recommended Texts	1- Giesecke, Frederick Ernest, et al. Technical drawing with engineering graphics. Vol. 15. Prentice Hall, 2016. 2- French, Thomas Ewing, and Charles J. Vierck. The fundamentals of engineering drawing and graphic technology. McGraw-Hill Companies, 1978.	yes
Websites	https://www.autodesk.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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Digital Systems**			**Module Delivery**	
Module Type	**C**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11304				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		**Semester of Delivery**	1	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	**Jannat.t.fanoos**		**e-mail**	**Jannat.t.fanoos@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date	**1/2/2025**		**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 Objectives أهداف المادة الدراسية	7. Understanding of basic Number Systems: Students should gain a solid understanding of various number systems and Codes such as decimal, binary, octal, hexadecimal, Binary Coded Decimal (BCD).and Gray system. 8. Analysis of LOGIC Gates: Students should be able to analyze and solve LOGIC Gates using tables for each circuit such as and, or, and other gates. 9. Boolean algebra and Logic Simplification: Students should learn about various rules and theorem of Boolean algebra and DeMorgan's Theorems. They should be able to calculate the equivalent expression of logic circuits by using Karnaugh map and SOP. 10. Combinational Logic Analysis: Students should be familiar with basic combinational circuit, they should be able to apply the pulse waveform inputs to the Combinational Logic gates and calculate the observed outputs.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	7. Recognize various number system and codes. 8. Use the various way to convert from system to another ones and vice versa. 9. Understand and apply the arithmetic operation for some of the system like sum, subtract, division and multiplication. 10. Apply some of arithmetic operation in logical circuit. 11. Describe logical gates like (and, or, not, nor, nand and ex-or). 12. Define the operation of each gate. 13. Identify the Boolean algebra and DeMorgan's theorems. 14. Apply Boolean algebra and DeMorgan's theorems to simplify the expressions. 15. Apply Karnaugh map and SOP to simplify the expression. 16. Explain the basic combinational logic circuit. 17. Apply the rules and use only (nand and nor gates) in connected circuit. 18. Identify the pulse waveform and applying it in the combinational logic circuits.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 7. Digital Systems and Binary Numbers [18 Hours] • 1.1 Digital Systems 1 • 1.2 Binary Numbers • 1.3 Number-Base Conversions • 1.4 Octal and Hexadecimal Numbers • 1.5 Complements of Numbers • 1.6 Signed Binary Numbers • 1.7 Binary Codes • 1.8 Binary Storage and Registers • 1.9 Binary Logic. 8. Boolean Algebra and Logic Gates [18 Hours] • 2.2 Basic Definitions • 2.3 Axiomatic Definition of Boolean Algebra • 2.4 Basic Theorems and Properties of Boolean Algebra • 2.6 Canonical and Standard Forms • 2.7 Other Logic Operations

	• 2.8 Digital Logic Gates • 2.9 Integrated Circuits 9. Gate-Level Minimization [18 Hours] - 3.1 Introduction - 3.2 The Map Method - 3.3 Four-Variable K-Map - 3.4 Product-of-Sums Simplification - 3.5 Don't-Care Conditions - 3.6 NAND and NOR Implementation - 3.7 Other Two-Level Implementations - 3.8 Exclusive-OR Function - 3.9 Hardware Description Language 10. Combinational Logic [18 Hours] - 4.1 Combinational Circuits - 4.2 Analysis Procedure - 4.3 Design Procedure - 4.4 Binary Adder–Subtractor2.6 Decimal Adder - 4.5 Binary Multiplier - 4.6 Magnitude Comparator - 4.8 Decoders - 4.9 Encoders - 4.10 Multiplexers - 4.11 HDL Models of Combinational Circuits

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	1 Digital Systems and Binary Numbers 1.1 Digital Systems 1 1.2 Binary Numbers 1.3 Number-Base Conversions 1.4 Octal and Hexadecimal Numbers
Week 2	1.5 Complements of Numbers 1.6 Signed Binary Numbers 1.7 Binary Codes
Week 3	1.8 Binary Storage and Registers 1.9 Binary Logic.
Week 4	2 Boolean Algebra and Logic Gates 2.2 Basic Definitions 2.3 Axiomatic Definition of Boolean Algebra
Week 5	2.4 Basic Theorems and Properties of Boolean Algebra 2.6 Canonical and Standard Forms
Week 6	2.7 Other Logic Operations 2.8 Digital Logic Gates 2.9 Integrated Circuits
Week 7	Mid Exam
Week 8	3 Gate-Level Minimization 3.1 Introduction 3.2 The Map Method 3.3 Four-Variable K-Map
Week 9	3.4 Product-of-Sums Simplification 3.5 Don't-Care Conditions

Week 10	3.6 NAND and NOR Implementation 3.7 Other Two-Level Implementations
Week 11	3.8 Exclusive-OR Function 3.9 Hardware Description Language
Week 12	4 Combinational Logic 4.1 Combinational Circuits 4.2 Analysis Procedure
Week 13	4.3 Design Procedure 4.4 Binary Adder–Subtractor2.6 Decimal Adder 4.5 Binary Multiplier 4.6 Magnitude Comparator
Week 14	4.8 Decoders 4.9 Encoders 4.10 Multiplexers 4.11 HDL Models of Combinational Circuits
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: logic gates
Week 2	Lab 2: logic gates
Week 3	Lab 3: Basic Combinational Logic Circuits
Week 4	Lab 4: Implementing Combinational Logic.
Week 5	Lab 5: Combinational Logic NOR Gates
Week 6	Lab 6: Combinational Logic Using NAND gates
Week 7	Exam
Week 8	Lab 7: adders
Week 9	Lab 8: Comparator
Week 10	Lab 9: Decoders
Week 11	Lab 10: Encoders
Week 12	Lab 11: Multiplexers
Week 13	Lab 12: Demultiplexers
Week 14	Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	M. Morris Mano, Michael D., Digital Design, 4th edition, Ciletti Prentice Hall	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall	Yes
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics I**			**Module Delivery**	
Module Type				☒**Theory** ☒**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE11301				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		computer engineering	**College**	College of engineering	
Module Leader	**Safaa.k.burhaan**		**e-mail**	**Safaa.k.burhaan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/3/2025	**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 Objectives أهداف المادة الدراسية	1. Make students able to analyze engineering problems and formulate mathematical models to solve them. 2. Understand mathematical concepts in engineering as apply matrix techniques to problems in engineering 3. Expressing linear transforms in other forms, such as matrix equations and vector equations. 4. Distinguishing between homogeneous and nonhomogeneous systems. 5. Apply systems of linear equations to problems in networking 6. Use the characteristic polynomial to find all eigenvalues and eigenvectors 7. In engineering, by domain and range one can used to design and optimize systems. 8. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes algebraic manipulation, trigonometric functions, calculus operations (such as differentiation and integration)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand and perform operations on matrices, including addition, subtraction, multiplication, and determination. 2. Apply Cramer's rule to solve systems of linear equations. 3. Calculate determinants and use them to determine properties of matrices. 4. Determine eigenvalues and eigenvectors of matrices. 5. Analyze and graph functions, including determining their domain and range. 6. Evaluate limits and determine continuity of functions. 7. Apply differentiation rules, including the chain rule and implicit differentiation, to find derivatives. 8. Apply integration rules and techniques, including integration by parts and partial fractions, to find antiderivatives. 9. Solve problems involving definite and indefinite integrals. 10. Understand and graph trigonometric functions, and apply their properties to solve problems. 11. Perform derivations and integrations involving trigonometric functions 12. Apply logarithmic and exponential functions in solving problems, and

	perform derivations and integrations involving these functions.
Indicative Contents المحتويات الإرشادية	• Matrices: Introduction to matrices and their operations. Determinants of matrices. Cramer's rule for solving systems of linear equations. Inverse matrices. • Systems of Linear Equations: • Eigenvalues and Eigenvectors: Understanding eigenvalues and eigenvectors of matrices. • Real Numbers and Functions: Understanding real numbers and intervals. Graphing functions and determining their domain and range. • limit and continuity Introducing the concept of limit and continuity. • Differentiation: Differentiation rules and examples. Chain rule and implicit differentiation. • Integration: Integration rules and techniques. Definite and indefinite integrals. • Trigonometric functions properties , Derivatives and integrals of Trigonometric functions • Logarithmic and Exponential Functions: Derivatives and integrals of logarithmic and exponential functions.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL) الحمل الدراسي 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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #10, LO #11
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Matrices: introduction, operation
Week 2	Matrix determination
Week 3	Inverse Matrices
Week 4	Solving a system of linear equations by Cramer's rule
Week 5	Solving a system of linear equations by inverse method
Week 6	Eigen value and Eigen vector
Week 7	(Mid-term Exam)
Week 8	Real Numbers, Intervals, Functions:graphs , domain and range
Week 9	Limit and continuity
Week 10	Differentiation
Week 11	Chain rule, implicit Differentiation
Week 12	Rules of integration, Definite and indefinite integrals
Week 13	trigonometric functions: derivations, integrations
Week 14	natural logarithm , exponential e^x: properties, derivations, integrations
Week 15	a^x, log_a^u : properties, derivations, integrations
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS ,STEPHEN DAVIS	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Computer Organization**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE12304				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	**Buraq.k.shebli**		**e-mail**	**Buraq.k.shebli@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/3/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	- To understand the structure, function and characteristics of computer systems. - To understand the design of the various functional units and components of computers. - To Understand basic machine organization, including processors, Storage, memory, and input/output architecture. - Understand the basics of the operating system and their types, the concept and techniques. - Understand the computer networks fundamentals just like topology and components and basic testing command. - To explain the function of each element of a memory hierarchy. - To identify and compare different methods for computer I/O.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the structure, function and characteristics of computer systems. 2. Understand the concept, Purpose, and characteristic of CPUs. 3. Learn the concepts of motherboards and its types. 4. Identify the names, Purposes, and characteristics of ROM and RAM 5. Identify the names, purpose, and characteristics of storage device (floppy, hard disk, optical, Blu-ray, flash drive, SSD, USB flash, Secure Digital Cards) 6. Learn the concepts of input and output devices. 7. Understand the fundamentals of operating system 8. Learn the fundamentals laptops and portable device
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Introduction of Computer • Development of Computer • Computer Communication • Introduction to Hardware, Software and operating system • Categories of computers

	• Identify the names, Purpose, and characteristic of CPUs • CPU types and techniques • Select CPU • Intel and AMD CPU development • CPU connection and interface • Identify the names, Purpose, and characteristic of motherboards • Motherboard components and form factors • BIOS, CMOS • Select a motherboard • Upgrade and configure a motherboard • Upgrade and configure BIOS • Identify the names, Purposes, and characteristics of ROM and RAM • RAM Basics and Types of RAM • Cache Memory • Selecting Ram • Upgrade and Configure of memory devices • Identify the names, purpose, and characteristics of storage device (floppy, hard disk, optical, Blu-ray, flash drive, SSD, USB flash, Secure Digital Cards) • Internal cables of storage device • Upgrade and configure storage device. • Fundamentals of operating system • History of OS • Development of OS • Operating Systems part2: • Fundamentals of laptops and portable devices • Describe Laptops and other portable devices • Identify common uses of PDAs and Smartphone • Compare and contrast desktop and laptop components.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fundamental Concepts of computer.
Week 2	Introduction to CPU
Week 3	BIOS and CMOS
Week 4	Introduction Motherboards and its types
Week 5	Memory Organization: Memory Hierarchy, Main memory, secondary memory
Week 6	Introduction to Storage Drives
Week 7	**Mid-term Exam**
Week 8	Introduction to Input and Output Device
Week 9	Types of connection cables
Week 10	Fundamental of operating system
Week 11	Types of OS
Week 12	Fundamentals of laptops and portable device
Week 13	Identify common uses of PDAs and Smartphone
Week 14	Troubleshooting and diagnostics of computer problems - Software troubleshooting
Week 15	Troubleshooting and diagnostics of computer problems - hardware troubleshooting
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. M. Moris Mano, "Computer Systems Architecture", 4th Edition, Pearson/PHI, ISBN:10:0131755633 2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th Edition, McGraw Hill.	Yes
Recommended Texts	1. A.Anandkumar, "Fundamentals of digital circuits", 4th edition, PHI. 2. William Stallings, "Computer Organization and Architecture", 6th Edition, Pearson/PHI, ISBN:10:0-13-609704-9	yes
Websites	https://www.coursera.org/learn/ computer organization fundamentals	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Fundamentals of Electrical Circuits II**			**Module Delivery**	
Module Type				☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**COE12305**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	**Safaa.k.burhaan**		**e-mail**	**Safaa.k.burhaan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/2/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Fundamentals of Electrical Circuits I	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	11. Understand the concept of impedance and apply it to analyze AC circuits, including calculating voltage and current phasors, and determining impedance values for capacitors and inductors. 12. Apply network theorems such as Thevenin's theorem, Norton's theorem, and superposition theorem to simplify complex AC circuits and calculate unknown quantities. 13. Calculate and analyze power in AC circuits, including real power, reactive power, apparent power, and power factor. Apply power factor correction techniques and calculate power losses and efficiency. 14. Analyze and solve series and parallel resonance circuits, including determining resonant frequency, bandwidth, quality factor, and understanding the frequency response characteristics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	19. AC Circuit Components: Students should learn about AC Generation and circuit components such as capacitors, inductors. They should understand their behavior in AC circuits, including the calculation of reactance, impedance, and power dissipation 20. AC Circuit Analysis: Students should develop a thorough understanding of alternating current (AC) circuits and their analysis. They should be able to apply concepts such as impedance, phasors, and complex numbers to analyze AC circuits, including calculating voltage and current phasors, power factor, and reactive power. 21. Circuit Analysis Techniques: Building upon the skills learned in Electric Circuit I, students should further develop their circuit analysis techniques. They should be able to analyze complex AC circuits using nodal analysis, mesh analysis, and various network theorems such as superposition, Thevenin, and Norton. 22. Power Analysis: Students should learn about power calculations in AC circuits, including real power, reactive power, and apparent power. They should understand power factor correction techniques and be able to calculate power losses and efficiency in AC circuits. 23. Resonance and Frequency Response: Students should understand the concept of resonance in AC circuits and be able to analyze series and parallel resonance circuits. They should be able to calculate resonant frequency, bandwidth, and quality factor, and understand the frequency response of different circuits. 24. Laboratory Skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should further develop skills in using measurement instruments, constructing and analyzing AC circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to AC Circuits: [15Hours] - Review of basic concepts: voltage, current, and resistance - Characteristics of AC voltage and current waveforms - RMS, peak, and average values of AC quantities - Phase relationship between voltage and current in AC circuits 2. Impedance and Phasor Analysis: [15Hours] - Definition and calculation of impedance - Representation of AC quantities using phasor diagrams

	- Complex numbers and their application in AC circuit analysis - Series and parallel impedance combinations in AC circuits 3. AC Circuit Analysis Techniques: [15Hours] - Application of Kirchhoff's laws (KCL and KVL) in AC circuits - Nodal analysis and mesh analysis in AC circuits 4. Power Analysis in AC Circuits: [15Hours] - Real power, reactive power, and apparent power in AC circuits - Power factor and power factor correction techniques - Calculation of power losses and efficiency in AC circuits 5. Resonance and Frequency Response: [15Hours] - Series and parallel resonance in AC circuits - Calculation of resonant frequency, bandwidth, and quality factor - Frequency response of AC circuits and its analysis 6. Review and Assessment: [6Hours] - Review of key concepts and techniques - Practice problems and exercises - Summative assessments (quizzes, tests, or exams)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Sinusoidal Alternating Current, AC Generation, Average Value
Week 2	RMS value, Response of Basic R, L, and C Elements to a Sinusoidal Voltage or Current
Week 3	Frequency response of the basic elements, Complex Number, Phasors
Week 4	Series Configurations in AC Circuits
Week 5	Parallel Configuration in AC Circuits
Week 6	Mesh & Nodal in AC
Week 7	Mid-course Exam
Week 8	Network Theorems in AC circuits: Superposition ,

Week 9	Thevenin's and Norton's theorems
Week 10	Power in AC circuits: Average power and power factor
Week 11	Reactive power , apparent power, and power triangle
Week 12	Power factor correction
Week 13	Resonance: series resonance, The Quality Factor (Q), resonance bandwidth
Week 14	Parallel resonance, parallel resonance Frequency
Week 15	Parallel resonant bandwidth, examples
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Capacitive and Inductive Reactance
Week 2	Lab 2: Resistor & Inductor in Series
Week 3	Lab 3: Resistor & Capacitor in Series
Week 4	Lab 4: Resistor, Inductor & Capacitor in parallel
Week 5	Lab 5: Series-parallel Resistor, Inductor & Capacitor circuits
Week 6	Lab 6: AC superposition
Week 7	Lab 7: Series Resonance circuits

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Introductory circuit Analysis; by Robert L. Boylestad	Yes
Recommended Texts	Sadiku, Matthew NO, and Charles K. Alexander. Fundamentals of electric circuits. New York: McGraw-Hill, 2009.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronic Physics**			**Module Delivery**	
Module Type				☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE12302				
ECTS Credits	7				
SWL (hr/sem)	175				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		Computer engineering	**College**	College of engineering	
Module Leader's Acad. Title		**Buraq.k.shebli**	**Module Leader's Qualification**		
Module Tutor			**e-mail**	**Buraq.k.shebli@gu.edu.iq**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		1/2/2025	**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The objective of this course is to: 1- enable the student to have a solid background in electronic physics 2- enable the student to have a solid background in the analysis of the characteristics and circuits of diode and zener diode. 3- the student will learn the specifications and applications of the diode and zener diode.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Will be able to tell theory of semiconductors: Explains an atom and basic terms related with an atom. 2- Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. 3- Recognizes p and n type materials and explains characteristics of these materials. 4- Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes 5- Will be able to analyze different diode circuits. 6- Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. 7- Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. 8- Analyzes and measures parameters in basic diode circuits.
Indicative Contents المحتويات الإرشادية	1- Will be able to tell theory of semiconductors. - Explains an atom and basic terms related with an atom. - Recognizes conductor, semiconductor, and insulator and explains characteristics of these materials. - Recognizes p and n type materials and explains characteristics of these materials. 2- Will be able to recognize types of diode, explain basic terms related with diodes and tell the operating principle of diodes. - Recognizes types and the construction of diodes. - Explains ideal diode, equivalent circuit and dc characteristic of a diode. - Tells the operating principles of diodes and zener diodes.

	3- Will be able to analyze different diode circuits. - Recognizes half-wave, full-wave and bridge rectifier circuits and explains the operation of these circuits. - Recognizes clipping and clamping circuits, explains the operation of these circuits and analyses these circuits. - Analyzes and measures parameters in basic diode circuits.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	96	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	30% (30)	4,9,10	LO #1, 2,3, 4 and 5
	Assignments	2	10% (10)	10,14	LO # 7 and 8
Summative assessment	**Midterm Exam**	2 hr	10% (10)	6	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction:** Atomic structure & electronic state (orbit, energy and valence) of electron.
Week 2	semiconductors, conductors and isolators, effects of temperature on depletion layer and P-N junction.
Week 3	**Characteristics of Diode:** forward and reverse bias and its relations.
Week 4	the diode operation and its conditions.
Week 5	zener region in terms of voltage and power dissipations, DC & AC resistance.
Week 6	Mid-Term Exam
Week 7	**Specifications of diode:** diode capacitance, reverse recovery time
Week 8	diode measuring and testing
Week 9	**Diode applications:** load line analysis,
Week 10	series diode configuration
Week 11	parallel & series configurations
Week 12	half – wave rectifier and peak reverse voltage
Week 13	full wave rectifier and related circuits (biased, diode clippers and clampers)
Week 14	zener diode and its applications
Week 15	**Review**
Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:
Week 2	Lab 2:
Week 3	Lab 3:

Week 4	Lab 4:
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mathematics II**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE12301				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level		UGI	**Semester of Delivery**		2
Administering Department		Computer engineering	**College**	College of engineering	
Module Leader	**Safaa.k.burhaan**		**e-mail**	**Safaa.k.burhaan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		1/2/2025	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 9. Understand the fundamentals of complex numbers and their properties. 10. Understand the differentiation and integration of inverse trigonometric functions. 11. Understand the differentiation and integration of hyperbolic trigonometric functions. 12. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 13. Identify integration applications such as Area under curve and area between two curves. 14. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 15. Understand polar coordinates and their properties. 16. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part • Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve • Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties

	• Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

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 types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Fundamental Concepts of complex numbers.
Week 2	Complex numbers properties- power and roots
Week 3	Introduction to Inverse Trigonometric function and their differentiation
Week 4	Inverse Trigonometric function Integration
Week 5	Introduction to Hyperbolic Trigonometric functions and their differentiation
Week 6	Hyperbolic Trigonometric functions integration
Week 7	**Mid-term Exam**
Week 8	Methods of integration – Integration by Part and integration using Partial fraction method
Week 9	Methods of integration – Integration using substation
Week 10	Integration applications – Area under curve and Area between two curves

Week 11	Integration applications – Area between two curves
Week 12	Integration applications – Volume of solid using Disk and Washer methods
Week 13	Introduction to polar coordinates and its properties
Week 14	Integral applications using polar coordinates – Area and length of curve
Week 15	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Workshop**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☒**Practical** ☐**Seminar**	
Module Code	COE12303				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGI		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	**aya.a.kadhim**		**e-mail**	**aya.a.kadhim@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Nil		**e-mail**	Nil	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	15/5/2025		**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 Objectives أهداف المادة الدراسية	A. Introduce students the basics of electrical and electronic devices, tools and circuits. B. Introduce students the basics of joining; welding and soldering processes. C. Introduce students to the basics of the electrical device and circuits with improving the skills that deal with methods of measurement and standardization. D. Introduce students to the basics of transformers, types and design. E. Introduce students to the basics of capacitors include the charging and dis charging circuits and the methods of test. F. Introduce students to the industrial electrical and skill of using tools and design of electrical circuits and control panels. G. Introduce students to the basics of the welding arts and installation of metal and the types of welding machines and skills to deal with the kinds of welding and measurement methods and standardization. H. Developing student skills in welding and soldering operations. I. Making students dealing with the problem and damage circuits to repair and fix it.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Acquire knowledge and understanding 2- Preparation of practical engineers in the field of electrical, network and computer engineering who are characterizing by a high level of knowledge and technological innovation, and work in with internationally approved discreet standards of quality assurance and academic accreditation of corresponding engineering programs with a commitment to ethics of engineering career. 3- learn and understand risk factors surrounding it enabled. 4- learn and understand some of the theoretical principles. 5- To be able subject-specific skills 6- To be able discussion and dialogue. 7- Brain storming by encouraging students to produce a large number of ideas about some issue or problem raised during the job. 8- Self-learning by teaching the student by his own according to his special abilities and mental and cognitive levels responding to his preferences and interests to achieve development and integration of his capabilities. 9- Cooperative learning by team working.
Indicative Contents المحتويات الإرشادية	**Indicative content includes the following.** Occupational Safety and importance ;(1 week) Tools and Devices; (1 week) Test methods; (1 week)

	Design and supply; (2 week) Welding and soldering processes; (2 weeks) Transformers and rectification circuits; (4 weeks) Capacitors and charging and discharging circuits; (3 weeks) Mini projects ; (1 weeks)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	No two days are the same and what might have worked once in a classroom, might not work again. Switching between teaching strategies to suit the needs of the learners is a great way to ensure that the learners are meaningfully engaged and actively participating in the classroom. 1- Visualization is very simply put, the ability to create mental images based on the words we hear or the text that we read. Some of the methods of implementing this strategy in the classroom include: - Use of audio visual aids like photos, videos, audio clips, songs etc - Diagrams, charts and mind maps - Modeling as you teach for the visual learners who might need to see a visual representation to understand as opposed to hearing the concept being explained. 2- Virtual learning has led educators to understand the importance of a key part of the learning process – cooperation. 3- Cooperative learning is an instructional strategy in which a small group of students collaboratively work on a given task. The task can be as simple as solving a quiz or as complex as writing a story.

Student Workload (SWL) الحمل الدراسي 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	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to the basics occupational Safety and importance and understanding the rules of Electrical Safety Principles.
Week 2	Understanding the principles of resistors and ohms law and design circuits.
Week 3	Understanding the principles of capacitors and the methods of test.
Week 4	Design and supplying charging and dis-charging circuits with required data.
Week 5	Understanding and learning all about AVO meter and how it's used.
Week 6	Understanding the principles of transformer and the methods of test.
Week 7	Design and supplying the rectification circuits.
Week 8	Introduction to; Semiconductors, diode, power diode, zener diode, LED diode; learning about every means
Week 9	Testing all diode types and designing circuits
Week 10	practical work
Week 11	practical work
Week 12	practical work
Week 13	practical work of welding process
Week 14	Work on small mini projects such as design a mini power supply
Week 15	Preparing a report about all subjects including a practical work

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: occupational Safety in workshop
Week 2	Lab 2: how to use tools and devices
Week 3	Lab 3: how to use AVO meter
Week 4	Lab 4: checking the resistors and coding
Week 5	Lab 5: design a parallel and series circuits
Week 6	Lab 6: checking the transformers
Week 7	Lab 7: designing the rectification circuits part 1
Week 8	Lab 8: designing the rectification circuits part 2
Week 9	Lab 9: welding processes: practical exercises
Week 10	Lab 10: soldering processes: practical exercises
Week 11	Lab 11: testing diode and zener diode
Week 12	Lab 12: testing LED diode
Week 13	Lab 13: supplying the mini power supply made by students as a small project

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Technical workshop (Materials & Devices) authored by Mazin N. Ali, 2016. Electrical & Electronics Engineering, Amrita School of Engineering, 2014 Electronics Workshop Lab Manual, Polytechnic, Bilaspur, 2010	yes
Recommended Texts	Engineering Workshop Data. A Book of Reference containing Data, Formulae, Tables, hints and Recipes relating to all Phases of Engineering Workshop Practice. Hardcover – 1 Jan. 1947.	No
Websites	https://www.slideshare.net/JosephKonnully/workshop-practise	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Arabic Language			**Module Delivery**	
Module Type				☒ **Theory**	
Module Code	GU12			☐ **Lecture**	
ECTS Credits	2			☐ **Lab**	
SWL (hr/sem)	50			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Level	UGI		**Semester of Delivery**	2	
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	01/02/2025		**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	○ تعزيز أهمية اللغة العربية كوسيلة للتواصل: ○ تُعدّ اللغة العربية وسيلة لنقل الرسائل بين المتكلمين، ولا يكون هذا التواصل واضحًا ومفهومًا إلا بترتيب المفردات وفق التركيب القواعدي الصحيح، مما يُبرز أهمية تدريس قواعد اللغة (النحو) في جميع اللغات. ○ تمكين الطالب من مهارات الكتابة والتعبير: ○ يهدف التعلم إلى تعريف الطالب بكيفية التعبير الكتابي الصحيح، مع القدرة على تمييز مواضع الخطأ وتصحيحها للنطق السليم. ○ إتقان مهارة الكتابة الصحيحة: ○ يتم ذلك من خلال معرفة قواعد الإملاء، وخاصة التنبّه للأخطاء الشائعة وتصويبها. ○ الحفاظ على اللغة العربية: ○ وذلك نظرًا لمكانتها الخاصة باعتبارها لغة القرآن الكريم، مما يستوجب العناية بها وتعلمها على أصولها. ○ التعريف بالمبادئ الأساسية للغة العربية: • من خلال تنمية المهارات في الكتابة، والتعبير، والمحادثة، لتأسيس فهم سليم وشامل للغة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. -**اكتساب الطالب معرفة المفاهيم الأساسية للغة العربية وتطبيقها** من خلال تقديم أمثلة عملية توضّح كيفية استخدام هذه المفاهيم في السياقات المختلفة. 2. **معرفة كتابة الكلام الصوتي بشكل مضبوط** ويتم ذلك من خلال التمييز بين الأصوات الصحيحة والأصوات المعتلّة، مما يساهم في الكتابة الصحيحة والنطق السليم. 3. **دراسة موضوع العدد** وفهم كيفية كتابته بالشكل الصحيح وفق القواعد النحوية والإملائية المعتمدة في اللغة العربية. 4. **تنمية الحس الفكري لدى الطالب من خلال التفكير التحليلي** عبر إيجاد الحلول المناسبة والصحيحة للمشكلات اللغوية المعقّدة، وتقديم أمثلة تطبيقية على استخدام اللغة العربية. 5. **تكليف الطلاب بكتابة بحوث وتقارير** بهدف اختبار مدى استيعابهم للقواعد الأساسية للغة العربية، وقدرتهم على تطبيق هذه القواعد في حياتهم اليومية بشكل فعّال.

Indicative Contents المحتويات الإرشادية	1. **إرشاد الطلاب إلى تكوين خزين معرفي** يتمثل في فهم أنظمة اللغة العربية، وأحكامها، وقواعدها الأساسية، لبناء قاعدة لغوية متينة. 2. **تمكين الطلاب من اكتساب المهارات اللغوية الأساسية** من خلال التطبيق العملي للكتابة والنطق، بما يعزز قدرتهم على استخدام اللغة بشكل سليم وفعّال. 3. **توجيه الطلاب للاطلاع على النصوص الأدبية** من الشعر والنثر في مختلف العصور، ومحاكاتها عبر كتابة نصوص تعبّر عن حياتهم اليومية، ومشاعرهم، وعواطفهم الذاتية. 4. **تنمية التفكير العالي لدى الطلاب** من خلال الأنشطة التي تعزز مهاراتهم وتحفّزهم على التحليل، والإبداع، والاستنتاج. 5. **تشجيع الطلاب على التعبير عن أفكارهم من خلال العمل الجماعي** عبر تشكيل مجموعات طلابية وتنظيم منافسات تفاعلية، لتعزيز مهارات التواصل والتعبير والتفكير الجماعي.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. **استخدام التعلم التعاوني** من خلال تقسيم الطلاب إلى مجموعات، تتعاون كل مجموعة في إعداد جزء من مادة الدرس وتقديمه، مما يعزز الفهم والمشاركة الفعّالة، خاصة لما للنحو من أهمية في تعلم اللغة والترجمة. 2. **الاعتماد على المحاضرات النظرية المباشرة** باستخدام السبورة كأداة لعرض المفاهيم النحوية بشكل منظم، مع تطبيق أمثلة توضيحية. 3. **تكليف الطلاب ببحوث جماعية** توزع على مجموعات طلابية بهدف تقييم مدى فهمهم للمادة واستيعابهم لمفاهيم النحو من خلال العمل البحثي. 4. **اتباع الطريقة الاستقرائية في التدريس** والتي تعتمد على عرض أمثلة أولًا ثم استنباط القاعدة النحوية منها، وهي طريقة فعالة لأنها تنمي التفكير الاستنتاجي لدى الطلاب. 5. **توظيف استراتيجيات مهارات التفكير ضمن مجموعات** تعتبر من أهم طرق التعلم الحديثة، حيث تتيح للطلاب تنمية مهارات التحليل، والاستنتاج، وحل المشكلات من خلال التفاعل الجماعي. 6. **استخدام استراتيجية التفكير الناقد والعصف الذهني** وهي من أبرز طرق التعليم النشط، حيث يتم طرح أسئلة مفتوحة تحفّز الطلاب على التفكير بعمق وتحليل القواعد النحوية وربطها بالاستخدام اليومي.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4

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

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	مقدمة عن علامات الترقيم والتعرف على أنواعها
Week 2	كتابة أنواع الهمزة (همزة القطعوالوصل ، همزة المتوسطة ، همزة المتطرفة)
Week 3	مكملات ضوابط الكتابة (التنوين ،والشدة ، المدة) والتعرف على أنواع الأخطاء اللغوية
Week 4	موضوع العدد وطريقة كتابته في اللغة العربية
Week 5	الخط العربي وأنواعه
Week 6	المشتقات (اسم الفاعل ، اسم المفعول ، اسما الزمان والمكان ، اسم الآلة)
Week 7	الفعل وأنواعه

Week 8	الفاعل والمفعول به

Week 9	امتحان مد
Week 10	المبتدأ والخبر
Week 11	المثنى والجمع وأنواعه
Week 12	الفرق بين التاء والهاء
Week 13	التذكير والتأنيث وأنواعها
Week 14	المعلقات
Week 15	مراجعة للطلاب قبل المتحان النهائي
Week 16	الاختبارات النهائية

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الوجيز في اللغة العربية ، محي هلال سرحان ، شرح قطر الندى وبل الصدى،لابن هشام الانصاري ، الاجرومية ابي عبدالله محمد الصنهاجي الاملاء والترقيم في الكتابة العربية ،عبد العليم ابراهيم ، اللغة العربية لغير المختصين ،مصطفى جطل وصلاح كزارة	Yes
Recommended Texts	جامع الدروس العربية ، مصطفى الغيلاني ،معاني النحو ، فاضل السامرائي دراسة في قواعد الاملاء د.عبد الجواد الطيب ، موسوعة الشامل في الكتابة والاملاء ،موسى حسن الهديب	No
Websites	1. https://shamela.ws/ 2. https://waqfeya.net/	

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.

Object Oriented Programming

Module Information معلومات المادة الدراسية					
Module Title	**Object Oriented Programming**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE21301				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	1	
Administering Department	**Computer Engineering**		**College**	Engineering	
Module Leader	**lina.t.sultan**		**e-mail**	**lina.t.sultan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Lina Thamer Sultan		**e-mail**		
Peer Reviewer Name			**e-mail**	E-mail	
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 Objectives أهداف المادة الدراسية	1. Understand Core OOP Concepts ◦ Grasp essential OOP concepts such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction. ◦ Learn how these concepts are used to model real-world entities and systems. 2. Apply OOP to Problem Solving ◦ Analyze real-world problems and break them down into manageable components using OOP methodologies. ◦ Develop logical, structured solutions by applying OOP principles to effectively model data and processes. 3. Write Modular and Reusable Code ◦ Design code that is modular, scalable, and reusable by adhering to the principles of object-oriented design. ◦ Learn to develop clean, maintainable software that reduces redundancy and enhances collaboration. 4. Implement OOP in Modern Programming Languages ◦ Gain hands-on experience programming in languages that support OOP, such as C++ or Java. ◦ Develop proficiency in writing, compiling, and debugging OOP code. 5. Leverage Design Patterns in OOP ◦ Introduce students to common design patterns such as Singleton, Factory, Observer, and others to solve recurring software design problems. ◦ Understand when and how to apply these patterns to improve software architecture and efficiency. 6. Collaborate on Software Development Projects ◦ Encourage teamwork through group projects, fostering collaboration in designing and developing software applications. ◦ Simulate a real-world software development environment where students engage in version control, testing, and iterative development cycles. 7. Develop Critical Thinking and Debugging Skills ◦ Instill problem-solving skills for debugging and optimizing OOP code. ◦ Encourage students to develop a habit of writing well-documented code that is easy to test and maintain. The course will prepare students for careers in software development by providing the tools and techniques necessary to build complex, efficient, and reliable applications using object-oriented programming.

Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1. Demonstrate Understanding of OOP Principles 2. Develop Object-Oriented Programs 3. Use Inheritance and Polymorphism in Software Design 4. Apply Encapsulation and Abstraction 5. Implement and Recognize Design Patterns 6. Debug and Test OOP Code 7. Work Collaboratively on Software Projects 8. Critically Evaluate and Optimize OOP Solutions
Indicative Contents **المحتويات الإرشادية**	Indicative content includes the following. Part A – OOP Theory 1. Introduction to Object-Oriented Programming ◦ Overview of programming paradigms, focusing on the evolution from procedural programming to OOP. ◦ Introduction to core concepts: objects, classes, methods, attributes, and constructors. ◦ Benefits of OOP in software development: modularity, reuse, and extensibility. ◦ [8 hrs] 2. Core OOP Concepts ◦ Encapsulation: Principles of data hiding, access modifiers (private, public, protected). ◦ Abstraction: Creating simplified representations of real-world entities through abstract classes and interfaces. ◦ Inheritance: Types of inheritance, base and derived classes, and reuse of code. ◦ Polymorphism: Method overloading and method overriding, dynamic vs static polymorphism. ◦ [10 hrs] 3. Classes, Objects, and Memory Management ◦ How to define classes and create objects, constructors, destructors, and the lifecycle of an object. ◦ Memory allocation, deallocation, and garbage collection in OOP. ◦ [6 hrs] 4. Exception Handling ◦ Introduction to exceptions, try-catch blocks, and throwing exceptions. ◦ Understanding exception hierarchies and custom exceptions. ◦ Writing robust OOP programs with effective error-handling techniques. ◦ [4 hrs] Part B – OOP Design and Programming

1. Object-Oriented Design (OOD)
    - Principles of software design using OOP: SOLID principles, cohesion, and coupling.
    - Understanding UML diagrams: class diagrams, sequence diagrams, and use case diagrams to model software.
    - Design patterns: Factory, Singleton, Observer, Decorator, and their implementation in OOP.
    - [12 hrs]
2. Programming with OOP Languages
    - Practical programming with languages like C++, Java, or Python.
    - Writing programs using classes, objects, inheritance, and polymorphism.
    - Managing file I/O, working with collections, and manipulating objects.
    - [18 hrs]
3. Advanced OOP Features
    - Concepts of abstract classes and interfaces and their differences.
    - Understanding and implementing generic programming (templates in C++, generics in Java).
    - Multithreading and synchronization in OOP, introducing concurrency in object-oriented design.
    - [14 hrs]
4. Testing and Debugging OOP Code
    - Unit testing with frameworks (e.g., JUnit for Java), writing test cases, and running automated tests.
    - Debugging OOP programs, tracking down logical and runtime errors.
    - Best practices for debugging and optimizing OOP code.
    - [6 hrs]
5. Collaborative Software Development and Version Control
    - Working in teams on software projects: implementing OOP design in collaborative environments.
    - Using version control systems (e.g., Git) to manage code, handle merges, and collaborate effectively on large-scale OOP projects.
    - Introduction to Agile and Scrum methodologies.
    - [6 hrs]

Part C – OOP Project Work

1. Capstone Project
    - Students will design, implement, and present a full object-oriented software solution as a final project.
    - The project will require the application of all learned OOP concepts, from design through implementation, testing, and documentation.

	◦ Emphasis on applying design patterns, inheritance, polymorphism, and other key OOP principles. ◦ [24 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	To teach Object-Oriented Programming (OOP), a combination of lectures and hands-on coding exercises will be used to introduce and reinforce core concepts like classes, inheritance, and polymorphism. Problem-based learning (PBL) will engage students in solving real-world challenges using OOP principles. Interactive coding demonstrations will illustrate practical applications, while project-based learning will encourage students to build full software solutions. Additionally, peer code reviews will foster collaboration and critical thinking, allowing students to refine their coding skills through feedback and discussion..

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) **الحمل الدراسي المنتظم للطالب خلال الفصل**	98	**Structured SWL (h/w)** **الحمل الدراسي المنتظم للطالب أسبوعيا**	6
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**	**150**		

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	Programming in C and C++-control structures, functions, pointers, arrays and structures.
Week 3	Introduction to Software Engineering-life cycle: analysis, design, implementation and maintenance
Week 4	Object-Oriented programming model-encapsulation, information hiding, polymorphism, inheritance.
Week 5	C++/0bject-Oriented concepts-classes, information hiding, encapsulation
Week 6	Simple linked data structures-linked lists, stacks, queues
Week 7	C++/Object-Oriented concepts-operator overloading
Week 8	C++/0bject-Oriented concepts-inheritance, and polymorphism.
Week 9	**Mid-term Exam**
Week 10	C++ templates, streams and stream I/O.
Week 11	C++ file processing, string class, string stream processing.
Week 12	C++ legacy code topics, standard template library.
Week 13	Fundamental computing algorithms C simple searching and sorting (linear and binary search, selection and insertion sort).
Week 14	Practices and exercises
Week 15	Projects, exams and review.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Set up development tools and write a basic "Hello, World!" program.
Week 2	Define classes and create objects with constructors and destructors.
Week 3	Implement methods and use access modifiers to control data access.
Week 4	Apply encapsulation and abstraction with abstract classes and interfaces.
Week 5	Implement inheritance to create base and derived classes.
Week 6	Use polymorphism through method overloading and overriding.
Week 7	Manage object memory and practice dynamic allocation.
Week 8	Learn exception handling with try-catch blocks and custom exceptions.
Week 9	Start a midterm project involving a simple OOP application.
Week 10	Work on advanced OOP features like abstract classes and interfaces.
Week 11	Implement and apply design patterns to solve common programming problems.
Week 12	Develop and debug complex OOP programs; focus on unit testing.
Week 13	Collaborate on a group project, applying OOP concepts in a team setting.
Week 14	Finalize and present group projects, demonstrating OOP knowledge.
Week 15	Review and reflect on key concepts, and discuss lessons learned from projects.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; Sth cdition, ISBN- 10: 0321714113, or ISBN-13:978-0321714114	Yes
Recommended Texts	Bjame Stroustrup, The Ct+ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13:978-0321 563842 (advanced)	Yes
Recommended Texts	Robert Lafore, Object-Oriented Programming in C++, Sams Publishing, 4th 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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication Fundamentals I**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE21303				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII2		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	**Buraq.k.shebli**		**e-mail**	**Buraq.k.shebli@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/2/2025**		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	2. Understanding Communication Systems: The subject aims to provide a fundamental understanding of analog communication systems. Students learn about the key components, concepts, and principals involved in the transmission and reception of signals in communication systems. 3. Signal Representation and Analysis: The subject focuses on the study of different signal representations, including continuous-time signals. Students learn to analyze signals using techniques such as Fourier transform. 4. Analog Communication Systems: The subject covers the principles and techniques used in analog communication systems. Students learn about modulation techniques, such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). They also study demodulation techniques and the impact of noise on analog signals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying analog communication systems. 2. Knowledge of Signal Representation: Acquire knowledge of various methods for representing analog signals, including time-domain and frequency-domain representations. 3. Familiarity with Analog Modulation Techniques: Gain an understanding of different analog modulation techniques such as amplitude modulation (AM), frequency modulation (FM), and phase modulation (PM). Understand the advantages, disadvantages, and applications of each technique. 4. Understanding of Noise and Channel Capacity: Learn about the effects of noise

	on communication systems and methods for mitigating its impact. Gain an understanding of channel capacity, bandwidth, and signal-to-noise ratio (SNR) calculations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Analog Communication Fundamentals: 1. Introduction to Analog Communication 2. Basic Concepts of Signals and Systems 3. Amplitude Modulation (AM) a. Amplitude Modulation Process b. Frequency Spectrum of AM Signal c. Modulation Index and Power Relations d. Demodulation Techniques for AM 4. Frequency Modulation (FM) a. Frequency Modulation Process b. Frequency Spectrum of FM Signal c. Deviation Ratio and Power Relations d. Demodulation Techniques for FM 5. Phase Modulation (PM) a. Phase Modulation Process b. Phase Spectrum of PM Signal c. Phase Modulation Index and Power Relations d. Demodulation Techniques for PM 6. Noise and Distortion in Analog Communication a. Types of Noise and Their Characteristics b. Signal-to-Noise Ratio (SNR) c. Noise Figure and Noise Temperature

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Analog Communication Strategies: 1. Signal Conditioning: Analog signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 2. Bandwidth Optimization: Analog signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth. 3. Noise Reduction: Analog signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	5 and 14	LO #1, #2 and #3, #4
	Assignments	2	10% (10)	2 and 14	LO #1, #2 and #3, #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	Midterm Exam	2hr	10% (10)	9	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction - Introduction to Communication Systems
Week 2	Elements of a Communication System and Mode of operations
Week 3	Fundamental Limitations and Modulation and Coding
Week 4	Review of Signal Classifications and Transmission of Signals through Linear Systems
Week 5	Linear modulation strategies that constitute the amplitude modulation family: Amplitude Modulation (AM)
Week 6	Double Sideband-Suppressed Carrier (DSB-SC): modulation and demodulation techniques
Week 7	Single Sideband (SSB): modulation and demodulation techniques
Week 8	super heterodyne receiver

Week 9	Mid-term Exam (from week 1 to week 8)
Week 10	Angle Modulation concepts and the Relationship between PM and FM Waves:
Week 11	Narrow-Band Frequency Modulation
Week 12	Wide-Band Frequency Modulation
Week 13	Transmission Bandwidth of FM Waves and Generation of FM Waves
Week 14	Demodulation of FM Signals
Week 15	Commercial FM transmitter
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction and Overview of the lab equipment
Week 2	Lab 2: Representation of Signals
Week 3	Lab 3: Amplitude Modulation
Week 4	Lab 4: Demodulation of an Amplitude Modulated Signal
Week 5	Lab 5: Generation of Frequency Modulation Signal
Week 6	Lab 6: Demodulation of Frequency Modulation Signal
Week 7	Lab 7: Review for all labs

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002	Yes
Recommended Texts	S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007	yes
Websites	https://www.coursera.org/learn/ analog communication fundamentals	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Systems Design I**			**Module Delivery**	
Module Type				☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE21304				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	**Jannat.t.fanoos**		**e-mail**	**Jannat.t.fanoos@gu.edu.iq**	
Module Leader's Acad. Title		L	**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2025	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	15. Understand the basics of distinguishing sequential logic from combinational logic. 16. Learn the basics of storage elements such as SR Latch and D Latch. 17. Learn the basics of Flip-Flops such as Edge-Triggered D Flip-Flop and other types of Flip-Flops. 18. Understand the behavior of a clocked sequential circuit which is determined from the inputs, the outputs, and the state of its flip-flops. 19. To distinguish between two models of sequential circuits: the Mealy model and the Moore model. 20. Learn the HDL basics which describes the functionality differently, by language constructs that represent the operations of registers in a machine. 21. Learn the state reduction and assignment design procedure 22. Understand the principles of different types of registers and counters, their working, and their storage characteristics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of basic of sequential logic: Students should gain a solid understanding of sequential logic circuit and their difference from combinational logic circuits that have been studied in the previous level. 2. Analysis of sequential logic circuits: Students should be able to analyze and write the truth tables, the output equations, and final results of sequential logic circuits. 3. Logic circuit components and their behavior: Students should learn about various circuit components such as Flip-Flops and registers. 4. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex logic circuits to determine output. 5. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 11. Introduction to Synchronous Sequential Logic [5Hours] 12. Storage Elements: Latches [5Hours] 13. Storage Elements: Flip-Flops [5Hours] 14. Analysis of Clocked Sequential Circuits [5Hours] 15. Synthesizable HDL Models of Sequential Circuits [5Hours] 16. State Reduction and Assignment [5Hours] 17. Design Procedure [5Hours]

	18. Mid-course Exam [2Hours for theoretical exam and 1 hour for practical exam] 19. Registers [5Hours] 20. Shift Registers [5Hours] 21. Universal Shift Register [5Hours] 22. Ripple Counters [5Hours] 23. Synchronous Counters [5Hours] 24. Other Counters [5Hours] 25. HDL for Registers and Counters [5Hours] 26. Review and Assessment: [5Hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Synchronous Sequential Logic
Week 2	Storage Elements: Latches
Week 3	Storage Elements: Flip-Flops
Week 4	Analysis of Clocked Sequential Circuits
Week 5	Synthesizable HDL Models of Sequential Circuits
Week 6	State Reduction and Assignment
Week 7	Design Procedure
Week 8	Mid-course Exam

Week 9	Registers
Week 10	Shift Registers
Week 11	Universal Shift Register
Week 12	Ripple Counters
Week 13	Synchronous Counters
Week 14	Other Counters
Week 15	HDL for Registers and Counters
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to VHDL and ModelSim
Week 2	Lab 2: Design of AND, OR, and NOT logic gates using VHDL in ModelSim
Week 3	Lab 3: Design of NAND, NOR, XOR, and XNOR logic gates using VHDL in ModelSim
Week 4	Lab 4: Design of flop-flops using VHDL in ModelSim
Week 5	Lab 5: Design of shift register using VHDL in ModelSim
Week 6	Lab 6: Design of counter using VHDL in ModelSim
Week 7	Lab 7: Design of ripple counter using VHDL in ModelSim

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Design: with an introduction to Verilog HDL by M. Morris Mano and Mechael D. Ciletti, 5th Edition, Pearson Education, 2013.	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall, 2015.	Yes
Websites	https://onlinecourses.nptel.ac.in/noc21_ee39/preview	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
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	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics I**			**Module Delivery**	
Module Type				☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE21306				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader's Acad. Title	**Buraq.k.shebli**		**Module Leader's Qualification**		
Module Tutor			**e-mail**	**Buraq.k.shebli@gu.edu.iq**	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/6/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course aims to: 1- enable the student to have a solid background in physical structure of BJT 2- enable the student to have a solid background in physical structure of FET transistors 3- enable the student to analyze the circuits of the BJT and FET transistors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9- the student will be able to tell the structure and the operation of transistors 10- the student will recognize the different types of transistors. 11- The student will recognizes the different configurations of circuits with transistors and the characteristics of these circuits and compares these circuits. 12- Analyzes transistor dc biasing. 13- Explains the operation of transistor dc biasing circuits. 14- Will be able to explain different circuits with transistors.
Indicative Contents المحتويات الإرشادية	- Will be able to tell the structure and the operation of transistors and recognize the different types of transistors. - Recognizes the different configurations of circuits with transistors and the characteristics of these circuits and compares these circuits. - Analyzes transistor dc biasing. - Explains the operation of transistor dc biasing circuits. - Will be able to explain different circuits with transistors.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	30% (30)	3,5,12	LO #2,3 and 5
	Assignments	2	10% (10)	6,13	LO # 3 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Introduction to transistor structure**
Week 2	transistor structure and its operations
Week 3	Analysis of currents.
Week 4	**Configuration of transistor:** bias configuration of a common- base
Week 5	bias configuration of a common- emitter
Week 6	bias configuration of a common- collector
Week 7	Mid-Term Exam
Week 8	**Transistor amplifications, The operation of transistor and its limitations.**
Week 9	**DC biasing circuit and its characteristics.**
Week 10	**Voltage divider, emitter stabilize and voltage feedback,**
Week 11	**Common- base and emitter follower configurations,**
Week 12	**Saturation level of transistor,**
Week 13	**Transistor switching configuration.**
Week 14	**FET construction, and biasing circuits**
Week 15	**review**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: dc analysis of common emitter transistor
Week 2	Lab 2: dc analysis of voltage divider transistor

Week 3	Lab 3: dc analysis of emitter follower transistor
Week 4	Lab 4: dc analysis of common base transistor
Week 5	Lab 5:
Week 6	Lab 6:
Week 7	Lab 7:

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Mathematics**			**Module Delivery**	
Module Type				☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE21302				
ECTS Credits	4				
SWL (hr/sem)	**100**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		Computer engineering	**College**	College of engineering	
Module Leader	**aya.a.kadhim**		**e-mail**	**aya.a.kadhim@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		**1/2/2005**	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	9. Partial derivatives are useful in analyzing surfaces for maximum and minimum points and give rise to partial differential equations in next stage. 10. Learn basics of vectors for many engineering quantities, such as forces, displacements, velocities, and accelerations, will need to be represented as vectors for analysis. 11. The major applications of multiple integrals in engineering is the determination of properties of plane, and whenever an area or a volume under a 2D curve (a surface) needs to be measured 12. Build a mathematical toolkit: The course introduces various mathematical tools and techniques necessary for engineering analysis. This includes • impart the knowledge of sequences and summation of series • Represent functions as Taylor and Maclaurin series. 13. Understand their engineering application
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	13. To evaluate partial derivatives and can implement to estimate maxima and minima of multivariable function 14. Understand the formula for the chain rule 15. Use the chain rule to find derivatives of composite functions 16. Apply the chain rule to a composition of three or more functions 17. View vectors geometrically 18. Find magnitude and direction 19. Perform vector addition and scalar multiplication 20. Find the component form of a vector 21. Find the unit vector in the direction of v 22. Perform operations with vectors in terms of i and j 23. Find the dot product of two vectors 24. Finding the equations of a line and of a plane 25. Evaluate a double integral

	26. Setting up triple integrals for a region 27. Understanding the definition of a sequence 28. define what it means for a series to converge or diverge 29. Classifying a sequence as finite or infinite 30. Classifying a sequence as geometric, or neither 31. Learn to represent functions as Taylor and Maclaurin series.
Indicative Contents المحتويات الإرشادية	• PARTIAL DERIVATIVES Functions of Two or More Variables The Chain Rule Directional Derivatives and Gradients Tangent Planes and Normal Vectors Local Maxima and Minima of Functions of Two Variables • VECTORS Dot Product Cross Product Planes in Space • VECTOR-VALUED FUNCTIONS Introduction to Vector-Valued Functions • MULTIPLE INTEGRALS Double Integrals Double Integrals in Polar Coordinates Triple Integrals • Sequences Infinite Series Geometric Series Convergence Tests The Comparison, Ratio, and Root Tests Maclaurin and Taylor Series

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Giving theoretical lectures 2- Solve many problems 3- Using illustration methods such as drawing 4- Direct discussion by asking questions and opening dialogue and interaction with students. 5- Giving video lecture if need

Student Workload (SWL) الحمل الدراسي 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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	20% (20)	Continuous	All
	Assignments	2	10% (10)	Continuous	All
	Report	1	10% (10)	11,12	LO #13 , LO #14
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Fourier series - introduction.
Week 2	Half range Fourier series
Week 3	Partial derivatives
Week 4	Chain rule
Week 5	Maxima, minima, and saddle points
Week 6	Vectors: Introduction
Week 7	Vectors: properties, dot product
Week 8	Vectors: cross product
Week 9	(Mid-term Exam)
Week 10	Equations of lines and planes in space
Week 11	Vector function
Week 12	Multiple Integrals: Double Integrals
Week 13	Double Integrals using polar coordinate
Week 14	Triple integrals
Week 15	Taylor and Maclaurin series
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Calculus By Thomas	Yes
Recommended Texts	CALCULUS EARLY TRANSCENDENTALS, By HOWARD ANTON, IRL BIVENS , STEPHEN DAVIS	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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Object Oriented Programming**			**Module Delivery**	
Module Type				☒**Theory**	
Module Code	COE21301			☐**Lecture**	
ECTS Credits	**6**			☒**Lab**	
SWL (hr/sem)	**150**			☐**Tutorial**	
				☐**Practical**	
				☐**Seminar**	
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	Collage of engineering	
Module Leader	**lina.t.sultan**		**e-mail**	**lina.t.sultan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**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 Objectives أهداف المادة الدراسية	1. Understand Object-Oriented Programming concepts and techniques. 2. Understand the principles of software engineering in Object-Oriented languages. 3. Understand the fundamentals of programming in C++. 4. Ability to design and implement Object-Oriented software to solve moderately complex problems. 5. Ability to write good program documentation. 6. Become familiar with the relationship between classes and objects. 7. Understand and learn how to create functions with different types.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Know the basic characteristics of C++ programming. 2. Analyze the problem and solve it with object oriented programming. 3. Understand the role that functions play in an object-oriented program. 4. Enable the student to know the principle of Classes and the benefits of the objects. 5. Enabling the student to know the principle of inheritance and a simple degree of polymorphism. 6. Enabling the student to acquire overload skills 7. Enable the student to acquire the skills of writing a private function and Public Function writing. 8. Analyze a problem and determine what problem elements to represent as functions or objects. 9. Apply object-oriented Programming fundamental techniques to develop small scale applications. 10. Trace, analyze, validate and deduce the output of given program code of different complexities.
Indicative Contents المحتويات الإرشادية	1. Giving the theoretical lectures. 2. Attendance education in laboratory lessons and implementation of the prescribed programs. 3. Using illustrations through lectures. 4. Direct discussion by asking questions and opening the door for dialogue and interaction with students. 5. Analysis of a computer program to solve real-world problems based on object-oriented principles. 6. Develop and enhance the student's thinking skill and move him to a higher level of thinking. 7. Creating confidence in the student to design and implement object-oriented programming to solve practical applied problems. 8. Raise the spirit of cooperation and work within a team. 9. Bring out creative ideas among students by raising the spirit of competition. 10. Group thinking skill strategy.

	11. Critical thinking strategy in learning. 12. Brainstorming. 13. Application software. 14. Student feedback.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Work effectively as an individual and as a member of a team 2. Demonstrate efficient IT capabilities 3. Developing capabilities and skills to gain the required level of experience and knowledge for the purposes of employment and personal development. 4. Enable the student to link the course outcomes with practical life. 5. Organized and effective planning for program design.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction C++ basics, Loops, and decisions.
Week 2	Arrays, Multidimensional Arrays, C-Strings, and The Standard C++ String.
Week 3	Structures, and The Address-of Operator &, and Pointer Variables.
Week 4	Functions, Overloaded Functions, and Inline Functions.
Week 5	C++/Object-Oriented concepts: objects, classes, reusability, inheritance, information hiding, encapsulation, and polymorphism.
Week 6	Objects, Classes, Member Functions
Week 7	Private Member Functions, Constructors and Destructors.
Week 8	Mid-course Exam

Week 9	Friend Function, Friend Class, and Array of Object.
Week 10	Operator Overloading, and this Pointer.
Week 11	Inheritance, Public and Private Inheritance, Class Hierarchies, and Multiple Inheritances.
Week 12	Encapsulation: Private, Public, and Protected Members Variables and Functions.
Week 13	C++ legacy code topics, C++ Templates, and standard template library.
Week 14	Fundamental Algorithms in C++ for searching and sorting such as find, sort, search, count, and merge.
Week 15	Member Functions with Vector: push_back(), size(), swap(), empty(), back(), and pop_back().
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: C++ Programming Basics and Loops and Decisions
Week 2	Lab 2: Arrays, Strings, Structures, and Pointers.
Week 3	Lab 3: Functions.
Week 4	Lab 4: Objects and Classes.
Week 5	Lab 5: Friend Function and Operator Overloading.
Week 6	Lab 6: Inheritance.
Week 7	Lab 7: C++ Templates and Algorithms.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Robert Lafore, Object-Oriented Programming in C++ , Sams Publishing, 4th Edition,	No
Recommended Texts	- Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, C++ Primer, Addison-Wesley Professional; 5th edition, ISBN-10: 0321714113, or ISBN-13: 978-0321714114 - Bjarne Stroustrup, The C++ Programming Language, Addison-Wesley Professional, 4th Edition, ISBN-10: 0321563840 ISBN-13: 978-0321563842	No
Websites	https://www.w3schools.com/cpp/default.asp https://www.geeksforgeeks.org/object-oriented-programming-in-cpp/	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Human rights and democracy			**Module Delivery**	
Module Type				☒**Theory** ☒**Lecture** ☐ **Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	GU234				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGII		**Semester of Delivery**	3	
Administering Department	Computer engineering		**College**	Collage of engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2025		**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 Objectives أهداف المادة الدراسية	5. Familiarize students with human rights and duties towards the individual and society 6. Highlighting the importance of the individual knowing his rights to carry out his duties to the fullest 7. Encouraging the student to study human rights, which contributes to the development of his thinking skills about human rights and freedom, and informs him of its bright side. 8. Introducing the student to how to deal with international and regional treaties and their internal legislation and to derive knowledge related to those rights and how to reflect them and their real and civilized role in the lives of peoples
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 7. Study theories of human rights and democracy 8. Clarification of the historical stages of human rights and their development 9. Clarification of the most important rights and duties granted to the individual and guaranteed constitutionally, which contribute to changing his life for the better 10. Promoting the idea of social justice for all individuals without discrimination on the basis of religion, race or color 11. Emphasizing and raising the spirit of citizenship, promoting the idea of belonging to the land and the homeland, and adhering to laws and regulations 12. Enhancing the student's thinking skill and creating his confidence during the dialogue on human rights 13. Introducing him to the method and mechanism of real dealing between the international and domestic community with human rights 14. Developing knowledge related to human rights and how they are reflected and their true civilized role in the lives of peoples

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Linguistic definition of the term human rights, its concept and origin Examples of the views of Arab and foreign scholars on the term human rights Definition of the French Declaration of the Rights of Man and of the Citizen The historical development of the idea of human rights, which we start with human rights in the civilization of Mesopotamian and Clarifying the structure of the social system in the Mesopotamian civilization The Universal Declaration of Human Rights, its history and provisions The phenomenon of administrative corruption and its repercussions on the human rights of the individual and society and ways to combat it and protect the individual and society from it Types of public rights and freedoms, which are divided into basic, intellectual and political rights Statement of basic rights, which include the right to life, dignity, liberty and personal safety, as well as the right to privacy, residence, movement and nationality A statement of intellectual rights and freedoms, which include freedom of belief and religion, freedom of expression, freedom of assembly and assembly, the right not to assemble, freedom of the press, as well as freedom of radio, television, cinema, theater, freedom of education, and the right to form associations and political parties A statement of political rights, which includes the right to equality and election The concept of democracy, its definition, and its types

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Giving theoretical lectures in an interactive way between the professor and the student in a direct way Using the method of direct discussion, asking questions, opening dialogue, setting examples, and interacting with students Giving students space to manage part of the lecture time to improve and expand critical thinking skills at the same time as applying a human right to presenting and defending his opinion without exposure to the opinion of others Assign students to prepare reports and billboards on the subject of human rights

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Meaning of right in the Arabic language and The concept of human rights
Week 2	Definition of human rights and the Universal Declaration of Human Rights
Week 3	The wisdom of God Almighty granting human rights and the French Declaration of Human and Citizen Rights
Week 4	Human rights in the Mesopotamian civilization
Week 5	The Social System in Mesopotamia Civilization
Week 6	the Universal Declaration of Human Rights
Week 7	The phenomenon of administrative corruption and its repercussions and successful solutions to combat administrative corruption and protect society from it

Week 8	**semester exam**
Week 9	**Fundamental rights and freedoms: the right to life and the right to dignity, liberty and personal safety**
Week 10	**The right to privacy, freedom of residence and movement, and the right to nationality**
Week 11	**Intellectual rights and freedoms: freedom of belief and religion, freedom of opinion and expression, the right to assembly and assembly, and the right not to assemble**
Week 12	**Freedom of the press, freedom of radio, television, cinema and theatre, freedom of education and the right to form associations and political parties**
Week 13	**Political rights: the right to equality and election**
Week 14	**Democracy concept and definition**
Week 15	**Types of democracy**
Week 16	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Human rights between text and application , Dr. Ali Shukri	Yes
Recommended Texts	Human rights , Dr. Maher Allawi	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Communication Fundamentals II**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22303				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	**Buraq.k.shebli**		**e-mail**	**Buraq.k.shebli@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/2/2025**		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	9. Digital Communication Systems: The subject introduces students to digital communication systems and the underlying concepts. They learn about various modulation schemes used in digital communications, such as phase shift keying (PSK), frequency shift keying (FSK), and frequency shift keying (FSK). The subject also covers, digital modulation, and demodulation. 10. Channel Capacity and Information Theory: Students gain an understanding of channel capacity, which measures the maximum data rate that can be reliably transmitted over a communication channel. 11. Performance Analysis: The subject includes the analysis of communication system performance metrics, such as signal-to-noise ratio (SNR), bit error rate (BER), and bandwidth efficiency. Students learn how to evaluate and compare the performance of different modulation schemes and communication system configurations.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding of Communication Systems: Gain a comprehensive understanding of the basic concepts and principles underlying digital communication systems. 2. Understanding of Digital Modulation Techniques: Learn about digital modulation techniques such as amplitude shift keying (ASK), frequency shift keying (FSK), phase shift keying (PSK), and quadrature amplitude modulation (QAM). Understand the principles behind these techniques and their applications in digital communication systems. 3. Familiarity with Digital Demodulation: Acquire knowledge of demodulation techniques used to extract the original information from modulated analog and digital signals. Understand the principles behind envelope detection, frequency demodulation, and phase demodulation. 4. Understanding of Noise and Channel Capacity: Learn about the effects of noise on communication systems and methods for mitigating its impact. Gain an understanding of channel capacity, bandwidth, and signal-to-noise ratio (SNR) calculations.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	Digital Communication Fundamentals: 1. Pulse Modulation Techniques a. Introduction to Pulse Modulation b. Pulse Amplitude Modulation (PAM) c. Pulse Width Modulation (PWM) d. Pulse Position Modulation (PPM) 2. Noise and Distortion in Analog Communication a. Types of Noise and Their Characteristics b. Signal-to-Noise Ratio (SNR) c. Noise Figure and Noise Temperature 3. Introduction to Digital Communication a. Binary Code Representations b. Pulse Code Modulation (PCM) c. Differential Pulse Code Modulation (DPCM) d. Delta Modulation (DM) 4. Baseband and Bandpass Digital Transmission a. Line Coding Techniques b. Baseband Transmission Schemes c. Bandpass Transmission Schemes d. Nyquist Criteria for Zero Intersymbol Interference 5.Digital Modulation Techniques a. Amplitude Shift Keying (ASK) b. Frequency Shift Keying (FSK) c. Phase Shift Keying (PSK) d. Quadrature Amplitude Modulation (QAM) 6.Error Detection and Correction

	a. Types of Errors in Digital Communication b. Parity Check and Hamming Code c. Cyclic Redundancy Check (CRC) d. Forward Error Correction (FEC) Techniques 7. Multiplexing Techniques a. Frequency Division Multiplexing (FDM) b. Time Division Multiplexing (TDM) c. Code Division Multiplexing (CDM) d. Orthogonal Frequency Division Multiplexing (OFDM) 8. Digital Communication Channels and Noise a. Channel Capacity and Shannon's Theorem b. Bit Error Rate (BER) and Signal-to-Noise Ratio (SNR) c. Error Performance Analysis in Digital Communication Systems d. Equalization Techniques for Mitigating Inter-symbol Interference (ISI)

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Digital Communication Strategies: 4. Signal Conditioning: Digital signals are susceptible to noise and interference. Signal conditioning techniques such as filtering, amplification, and modulation can be used to enhance the quality and integrity of the analog signal before transmission. 5. Bandwidth Optimization: Digital signals require a certain amount of bandwidth for transmission. By employing techniques such as frequency division multiplexing (FDM) or time division multiplexing (TDM), multiple analog signals can be transmitted simultaneously, optimizing the available bandwidth. 6. Noise Reduction: Digital signals are prone to noise, which can degrade the signal quality. Strategies like shielding, grounding, and balanced transmission lines can be used to minimize noise and interference during transmission.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	20% (20)	1, 2 and 3	LO #1, #2 and #3
	Assignments	2	10% (10)	2, 3 and 4	LO #2, #3 and #4
	Projects / Lab.	1	10% (10)	Continuous	All
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction – Digital communication system
Week 2	Transition from Analog to Digital Communications
Week 3	The sampling Theorem, Pulse-amplitude modulation, The quantization process
Week 4	Pulse-code modulation, Delta modulation
Week 5	Multiplexing Systems
Week 6	Frequency-Division Multiplexing, Time-Division Multiplexing
Week 7	Mid-term Exam
Week 8	Digital Band-pass Modulation Techniques
Week 9	Binary Amplitude-Shift Keying

Week 10	Coherent Detection of ASK Signals
Week 11	Noncoherent Detection of ASK Signals
Week 12	Phase-Shift Keying
Week 13	Binary Frequency-Shift Keying (BFSK)
Week 14	FSK Bit Rate, Baud, and Bandwidth
Week 15	Continuous-Phase Frequency-Shift Keying
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction and Overview of the lab equipment
Week 2	Lab 2: Sampling Theory and Aliasing
Week 3	Lab 3: Pulse Code Modulation
Week 4	Lab 4: DELTA MODUALATION
Week 5	Lab 5: Amplitude Shift Keying Generation
Week 6	Lab 6: Phase Shift Keying Generation
Week 7	Lab 7: frequency Shift Keying Generation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	F.G. Stremler, Introduction to Communication Systems, 2nded, 1982 A. B. Carlson, Communication Systems, McGraw Hill, 4thed, 2002	Yes
Recommended Texts	S.S. Haykin, Communication Systems, Wiley, 2001.B Behrouz A. Forouzan, Data communications and networking, 4thed, 2007	No
Websites	https://www.coursera.org/learn/ analog communication fundamentals	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Data structures and algorithms**			**Module Delivery**	
Module Type				☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22306				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer Engineering		**College**	College of Engineering	
Module Leader	**Haneen.J**		**e-mail**	**Haneen.J@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	**1/2/2025**		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	8. An overview of programming concepts and discrete mathematics. 9. Teaching the student how to represent data in computer memory. 10. Teaching the student linear and non-linear data structures and their types and programming addition, deletion, and search algorithms. 11. Efficiently perform operations on lists, stack and queues. 12. Understand the non-linear data structures represented by trees, their synthesis and programming. 13. Ability to distribute data by Hashing table and Priority Queues (Heaps). 14. Teaching the student the various methods and techniques of searching and arranging data in each of the data structures.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Understand the principle of recursion function in solving problems. 12. Enable the student to acquire overwrite skills. 13. Problem analysis and solution using data structures and Understand the role data structures play in storing information. 14. How to efficiently perform operations on Linked Lists, Linked Stacks, and Linked Queues. 15. Enabling the student to understand three types of tree traversal techniques. 16. How to estimate the time required for a program. 17. How to reduce the running time of a program from days or years to fractions of a second. 18. How to choose one operation to be more efficient if another less efficient. 19. Analyze a problem and determine what problem elements to represent by data structures and algorithms. 20. Apply data structures and algorithms fundamental techniques to develop small scale applications. 21. Trace, analyze, validate and deduce the output of given program code of different complexities.
Indicative Contents المحتويات الإرشادية	15. Giving theoretical lectures. 16. Attendance education in laboratory lessons and implementation of the prescribed programs. 17. Using illustrations through the lectures. 18. Direct discussion by asking questions and opening the door for dialogue and interaction with students. 19. Participation during the electronic lecture and answer the questions. 20. Application of software on the computer for the practical laboratory. 21. Analysis of a computer program to solve real-world problems based on data structures and algorithms principles. 22. Develop and enhance the student's thinking skill and move him to a

	higher level of thinking. 23. Creating confidence in the student to design and implement data structures and algorithms to solve practical applied problems. 24. Raise the spirit of cooperation and work within a team. 25. Bring out creative ideas among students by raising the spirit of competition. 26. Group thinking skill strategy. 27. Critical thinking strategy in learning. 28. Brainstorming. 29. Application software. 30. Student feedback.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	6. Work effectively as an individual and as a member of a team 7. Demonstrate efficient IT capabilities 8. Developing capabilities and skills to gain the required level of experience and knowledge for the purposes of employment and personal development. 9. Enable the student to link the course outcomes with practical life. 10. Organized and effective planning for program design.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	71	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Data structures and Algorithms, Abstract Data Type, Linear and non-Linear data structures
Week 2	A General Overview on recursion function and algorithm analysis
Week 3	Linked Lists, three type of Insertion and Deletion on Linked Lists, Double Linked List
Week 4	The Stack, The functions associated with stack, Linked Stack, Applications of Stack: Expressions Calculator (Infix, Prefix, and Postfix notation)
Week 5	The Queue and Linked Queue
Week 6	The Tree, Binary Tree
Week 7	Tree Traversals: Inorder, Preorder, and Postorder Traversal

Week 8	Mid-course Exam
Week 9	The Search Tree ADT–Binary Search Trees, AVL Trees, Splay Trees, B-Trees, Sets and Maps in the Standard Library
Week 10	Hashing: General Idea, Hash Function, Separate Chaining
Week 11	Priority Queues (Heaps), Model, Simple Implementations, Binary Heap
Week 12	Applications of Priority Queues, d-Heaps, Leftist Heaps, Skew Heaps, Binomial Queues, Priority Queues in the Standard Library
Week 13	Sorting: Preliminaries, Insertion Sort, Shellsort, Heapsort, Mergesort
Week 14	Quick sort, Bucket Sort, External Sorting
Week 15	Algorithm Design Techniques: Greedy Algorithms, Divide and Conquer, Dynamic Programming, Randomized Algorithms, Backtracking Algorithms
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: A General Overview
Week 2	Lab 2: Linked Lists
Week 3	Lab 3: Stacks, Linked Stack
Week 4	Lab 4: Queue, Linked Queue
Week 5	Lab 5: Sets and Maps
Week 6	Lab 6: Hashing, Priority Queues (Heaps)
Week 7	Lab 7: Sorting

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Data Structures and Algorithm Analysis in C++ (Fourth Edition), by M. A. Weiss. Addison-Wesley, ISBN-10: 032144146X & ISBN-13: 9780321441461	No
Recommended Texts	C++ How to Program (5th Edition), by (Harvey & Paul) Deitel & Associates. Prentice Hall, ISBN-10: 0131857576 & ISBN-13: 9780131857575	No
Websites	https://www.w3schools.in/data-structures-tutorial/intro/ https://www.geeksforgeeks.org/data-structures/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
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	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
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	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Operating system**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22305				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	Collage of engineering	
Module Leader	- **lina.t.sultan**		**e-mail**	E-mail **lina.t.sultan@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**	E-mail	
Scientific Committee Approval Date		2025/6/1	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	12. provide an understanding of the fundamental concepts, principles, and functions of operating systems. 13. To explore the various components and mechanisms involved in managing computer hardware and software resources. 14. To develop knowledge and skills related to process management, memory management, file systems, and other key aspects of operating systems. 15. To foster critical thinking and problem-solving abilities in the context of operating system design and implementation. 16. To prepare students for advanced studies or professional careers in operating systems, systems programming, or related fields. 17. To explore advanced topics such as distributed systems, real-time systems, and virtualization. 18. To develop skills in analyzing and designing complex operating system architectures. 19. To explore emerging trends and technologies in the field of operating systems. 20. To prepare students for advanced research or professional careers in operating systems or related areas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of the course, students should be able to: 1. Explain the basic concepts, types, and functions of operating systems. 2. Understand process management, including process creation, scheduling, and synchronization. 3. Analyze and apply memory management techniques, including virtual memory and page replacement algorithms. 4. Describe file system concepts, file organization, and access methods. 5. Understand input/output (I/O) management, including device drivers and I/O operations. 6. Discuss protection and security mechanisms in operating systems. 7. Understand the principles of multi-programming, multi-tasking, and CPU scheduling. 8. Explain the basics of distributed operating systems and networking. 9. Analyze and troubleshoot common issues related to operating systems. 10. Understand and design distributed systems and inter-process communication mechanisms. 11. Analyze and design real-time operating systems for time-critical applications. 12. Understand and apply virtualization technologies and techniques. 13. Explore emerging trends and technologies in the field of operating systems. 14. Conduct research, analyze and critically evaluate operating system research papers.

Indicative Contents المحتويات الإرشادية	The following are indicative topics that may be covered in an operating systems course: 1. Introduction to Operating Systems: • Definition, types, and functions of operating systems. • Historical overview and evolution of operating systems. • Operating system structures and components. 2. Process Management: • Process concepts, process states, and process control block (PCB). • Process creation, scheduling, and context switching. • Interprocess communication and synchronization. 3. Memory Management: • Memory hierarchy and memory management techniques. • Address spaces, logical vs. physical memory, and memory allocation. • Paging, segmentation, and virtual memory. 4. File Systems: • File concepts, file organization, and access methods. • Directory structures and file allocation methods. • File system implementation, disk management, and file I/O operations. 5. Input/Output Systems: • I/O devices, device controllers, and device drivers. • I/O operations, buffering, and spooling. • Interrupt handling and I/O scheduling algorithms. 6. CPU Scheduling: • CPU scheduling algorithms and their evaluation. • Process coordination, synchronization, and deadlock prevention. • Multi-programming and multi-tasking concepts. 7. Distributed Operating Systems: • Introduction to distributed systems and networking. • Distributed system architectures and models. • Distributed file systems, distributed process management, and synchronization. • Communication protocols and distributed resource allocation. • Fault tolerance and replication in distributed systems. 8. Real-Time Operating Systems: • Characteristics and requirements of real-time systems. • Real-time scheduling algorithms and analysis. • Resource management and synchronization in real-time systems. • Real-time operating system design considerations. 9. Virtualization: • Virtualization concepts and techniques. • Virtual machine management and resource allocation.

	• Virtualization security and performance considerations. 10. Advanced Memory Management: • Advanced memory management techniques, such as segmentation and paging. • Memory protection and access control mechanisms. • Memory virtualization and memory ballooning. • Memory management in virtualized environments. 11. Advanced Process and Thread Management: • Multi-core and multi-threaded systems. • Thread scheduling algorithms and techniques. • Process migration and load balancing. • Thread synchronization and concurrency control mechanisms. 12. Security in Operating Systems: • Security threats and vulnerabilities in operating systems. • Access control mechanisms, including mandatory and discretionary access control. • Intrusion detection and prevention systems. • Security in virtualized environments. 13. Emerging Trends in Operating Systems: • Cloud computing and operating systems. • Edge computing and Internet of Things (IoT) operating systems. • Containerization and container orchestration systems. • Operating systems for specialized architectures (e.g., GPUs, mobile devices).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Interactive Demonstrations: Conduct interactive demonstrations of operating system functionalities and features. Use visual aids, interactive tools, or live demonstrations to engage students and enhance their understanding of complex concepts. 2. Online Resources and Tutorials: Recommend online resources, tutorials, and interactive platforms that offer supplementary materials and exercises for self-paced learning. This allows students to explore topics at their own pace and reinforce their understanding of operating systems. 3. Formative Assessments and Feedback: Provide regular formative assessments, such as quizzes or short assignments, to gauge students' understanding of operating system concepts. Provide prompt feedback to

	address misconceptions and guide students towards a deeper understanding of the subject. 4. Group Projects and Collaborative Learning: Assign group projects that require students to work collaboratively to solve operating system-related problems. This encourages teamwork, communication, and the exchange of ideas, and allows students to learn from each other's experiences. 5. Discussions and Debates: Engage students in discussions and debates on operating system-related topics. Encourage critical thinking, analysis of different viewpoints, and the exploration of alternative approaches to operating system design and implementation. 6. Case Studies and Real-World Examples: Use case studies and real-world examples to illustrate the application of operating system concepts. This helps students understand how operating systems are used in practical scenarios and reinforces their understanding of the subject matter. 7. Stay Updated with Technology Advances: Stay informed about the latest advancements in operating systems and related technologies. Incorporate current trends and emerging technologies into the curriculum to ensure students are exposed to relevant and up-to-date knowledge.

Student Workload (SWL) الحمل الدراسي 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	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Operating Systems, Computer-System Organization, Computer-System Architecture, Operating-System types, functions Structure and components
Week 2	Operating-System Operations, Process Management, Memory Management, Storage Management
Week 3	Operating System Structure, Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs
Week 4	Operating System Design and Implementation, Operating System Structure, Operating System Debugging, Operating System Generation, System Boot
Week 5	Process, Process Concept, Process Scheduling , Operations on Processes, Inter-process Communication
Week 6	File concepts, organization, access methods, Directory structures ,file allocation methods ,File system implementation, disk management and file I/O operations..

Week 7	I/O devices, device controllers, , device drivers.I/O operations, buffering, spooling, Interrupt handling and I/O scheduling algorithms
Week 8	**Midterm Exam**
Week 9	Introduction to distributed systems ,Distributed file systems, distributed process management, and synchronization , distributed resource allocation,Fault tolerance and replication
Week 10	Real-time systems Characteristics and requirements, scheduling algorithms and analysis, Resource management and synchronization and system design considerations.
Week 11	Virtualization concepts and techniques , Virtual machine management and resource allocation ,Virtualization security and performance considerations
Week 12	Advanced memory management techniques , Memory protection Memory virtualization
Week 13	Advanced Process and Thread Management: Process migration and load balancing. Thread scheduling, synchronization and control
Week 14	Security in Operating Systems
Week 15	Emerging Trends in Operating Systems:
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• William stallings "operating systems - internals and design principles" 7th edition,2011 • "Modern Operating Systems" by Andrew S. Tanenbaum and Herbert Bos	Yes
Recommended Texts	• "Distributed Systems: Principles and Paradigms" by Andrew S. Tanenbaum and Maarten Van Steen • "Real-Time Systems" by Jane W. S. Liu	No
Websites	https://learn.saylor.org/course/view.php?id=94 https://www.classcentral.com/subject/operating-systems	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Analysis**			**Module Delivery**	
Module Type				☒**Theory** ☐ **Lecture** ☐**Lab** ☒**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22301				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	**aya.a.kadhim**		**e-mail**	**aya.a.kadhim@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objective of this course is to develop an understanding of the basic ideas of mathematics encountered in engineering. Focus will be on the methods for understanding complex numbers and fundamentals of the derivative and integration of inverse trigonometric functions. Students will learn some special integration techniques (Integration by part, partial fraction, and substitution) that are useful for the understanding of different engineering subjects. Another objective is to teach the Engineering student about integration applications such as Area under curve and volume. Finally, the student will learn the concept of polar coordinates and its application.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of the course, student will be able to: 1. Understand the fundamentals of complex numbers and their properties. 2. Understand the differentiation and integration of inverse trigonometric functions. 3. Understand the differentiation and integration of hyperbolic trigonometric functions. 4. Express the concepts of methods of integration and their different types which can be used in a wide variety of disciplines in engineering. 5. Identify integration applications such as Area under curve and area between two curves. 6. Apply different integration rules to determine the volume of solid using Disk and Washer methods. 7. Understand polar coordinates and their properties. 8. Apply the concept of polar coordinates to solve integration applications.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: • Fundamental Concepts of complex numbers. • Complex numbers properties- power and roots • Inverse Trigonometric function and their differentiation • Inverse Trigonometric function Integration • Hyperbolic Trigonometric functions and their differentiation • Hyperbolic Trigonometric functions integration • Methods of integration – Integration by Part

	• Methods of integration - Partial fraction method • Methods of integration – Integration using substation • Integration applications – Area under curve • Integration applications – Area between two curves • Integration applications – Volume of solid using Disk method • Integration applications – Volume of solid using Washer methods • Polar coordinates and its properties • Area under curve in Polar coordinates • Area between two curves in Polar coordinates • Length of curve in Polar coordinates.

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 types of simple reports involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	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	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
Formative assessment	**Quizzes**	2	15% (15)	5 and 10	LO #2, #3 and #5, #6
	Assignments	2	15% (15)	2 and 12	LO #1 and #5
	Report	1	10% (10)	13	LO # 3, #4, #5, and #6
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #3
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Ordinary differential equation – first order- variable separable
Week 2	Ordinary differential equation – first order- homogenous
Week 3	Ordinary differential equation – first order- Exact
Week 4	Ordinary differential equation – first order - Linear
Week 5	Ordinary differential equation – second order – undetermined coefficient
Week 6	Ordinary differential equation – second order – variation of parameter
Week 7	Ordinary differential equation – higher order
Week 8	**Mid-term Exam**
Week 9	Laplace transform - properties

Week 10	Inverse Laplace transform
Week 11	Solving Ordinary differential equation using Laplace transform
Week 12	Z - transform
Week 13	Z - transform properties
Week 14	Inverse Z - transform
Week 15	**Preparatory week before the final Exam**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus, Single Variable, Joel Hass, Christopher Heil, Maurice Weir, Pearson, 2017.	Yes
Recommended Texts	Thomas' Calculus Early Transcendentals, George Thomas, Maurice D. Weir, Joel Hass, Pearson, 2014.	yes
Websites	https://www.coursera.org/learn/ calculus I	

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.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Electronics II**			**Module Delivery**	
Module Type	core			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	COE22302				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGII		**Semester of Delivery**	4	
Administering Department	Computer engineering		**College**	College of engineering	
Module Leader	**aya.a.kadhim**		**e-mail**	**aya.a.kadhim@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	1/6/2025		**Version Number**	1	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Electronics I	**Semester**	3
Co-requisites module	-	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This course aims to: 4- enable the student to have a solid background in physical structure of BJT 5- enable the student to have a solid background in physical structure of FET transistors 6- enable the student to analyze the circuits of the BJT and FET transistors.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- Explains the amplification in amplifier circuits with transistors. - Analyzes and Calculates the hybrid parameters and performs measurements in different amplifier circuits. - Calculates the hybrid parameters of the equivalent circuit of a transistor. - Explains cascade amplifier circuits - Calculates parameters in cascade amplifier circuits. - Understand the Frequency Response
Indicative Contents المحتويات الإرشادية	- Explains the amplification in amplifier circuits with transistors. - Analyzes and performs measurements in different amplifier circuits. - Calculates the hybrid parameters of the equivalent circuit of a transistor. - Explains cascade amplifier circuits - Calculates parameters in cascade amplifier circuits.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted to increase the student interest to understand this module is by drawing sketches that can assist the imagination of the student about the certain subject as well as to make the students participate through fast questions and quizzes.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	125		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	30% (30)	3,5,12	LO #1,2,3 and 6
	Assignments	2	10% (10)	2,12	LO # 2 and 6
Summative assessment	**Midterm Exam**	2 hr	10% (10)	10	LO # 1-5
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction : Amplification in the AC Domain
Week 2	BJT Transistor Modeling :The Important Parameters: Zi, Zo, Av, Ai, The re Transistor Model
Week 3	The Hybrid Equivalent Model Graphical Determination of the h-parameters Variations of Transistor Parameters
Week 4	Multistage Amplifier
Week 5	FET Circuit Analysis
Week 6	Introduction :Two-Port Systems , Effect of a Load Impedance (*RL*)
Week 7	Effect of a Source Impedance (*Rs*) Combined Effect of *Rs* and *RL*
Week 8	BJT CE Networks , BJT Emitter-Follower Networks
Week 9	BJT CB Networks
Week 10	**Mid exam**
Week 11	General Frequency Considerations Low-Frequency Analysis—Bode Plot Low-Frequency Response—BJT Amplifier
Week 12	Low-Frequency Response—FET Amplifier
Week 13	Miller Effect Capacitance
Week 14	High-Frequency Response—BJT Amplifier High-Frequency Response—FET Amplifier Multistage Frequency Effects
Week 15	**review**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Ac analysis of common emitter transistor
Week 2	Lab 2: Ac analysis of voltage divider transistor
Week 3	Lab 3: Ac analysis of emitter follower transistor
Week 4	Lab 4: Ac analysis of common base transistor
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices & Circuit Theory", By R. Boylestad, 11th ed.	yes
Recommended Texts	" Electronic Devices", By Floyd. 9th ed.	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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Systems Design II**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐ **Lecture** ☒**Lab** ☒ **Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	COE22304				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		4
Administering Department		Computer Engineering	**College**	College of Engineering	
Module Leader	**Jannat.t.fanoos**		**e-mail**	**Jannat.t.fanoos@gu.edu.iq**	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	-		**e-mail**	-	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	01/06/2025		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	23. Understand the basics of Random-Access Memory and how to store binary information in RAM. 24. Understand the Memory Decoding and how to demonstrate the operation of decoding. 25. Understand Error Detection and Correction: An error-correcting code generates manifold parity check bits that are stored with the data word in memory. Each check bit is a parity over a group of bits in the data word. 26. Understand the basics of Read-Only Memory permanent in which binary information is stored. 27. Understand the Programmable Logic Array, the PAL device with a fixed OR array and a programmable AND array. 28. Understand the Sequential Programmable Devices 29. Learn Register Transfer Level in HDL which transfers are specified by means of procedural assignment statements within an edge-sensitive cyclic behavior. 30. Learn Algorithmic State Machines (ASMs) where the operations are implemented with digital hardware components such as adders, decoders, multiplexers, counters, and shift registers. 31. Learn Control Logic and Sequential Binary Multiplier. 32. Learn Design with Multiplexers in which the flip-flops that hold the binary state value, the decoder that generates the control outputs, and the gates that determine the next-state and output signals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Understanding of basic of memory storage: Students should gain a solid understanding of memory storage such as RAM, ROM, and other circuits. 7. Analysis of sequential programmable devices: Students should be able to analyze and write the truth tables, the output equations, and final results of sequential programmable devices. 8. Algorithmic State Machines and their behavior: Students should learn about command signals that coordinate and execute the various operations in the data section of the machine in order to accomplish the desired data-processing tasks. 9. Circuit analysis techniques: Students should develop skills in circuit analysis techniques, including using circuit diagrams, identifying circuit elements, and applying systematic problem-solving approaches. They should be able to analyze simple and complex logic circuits to determine output. 10. Laboratory skills: Depending on the course, students may have the opportunity to apply their theoretical knowledge through hands-on laboratory experiments. They should develop skills in using measurement instruments, constructing circuits, and verifying theoretical concepts through practical experiments.
Indicative Contents	Indicative content includes the following. 27. Random-Access Memory: [5Hours]

المحتويات الإرشادية	28. Memory Decoding: [5Hours] 29. Error Detection and Correction: [5Hours] 30. Read-Only Memory: [5Hours] 31. Programmable Logic Array: [5Hours] 32. Programmable Array Logic: [5Hours] 33. Sequential Programmable Devices: [5Hours] 34. Mid-course Exam: [2Hours theoretical exam + 1hour practical exam] 35. Register Transfer Level Notation: [5Hours] 36. Register Transfer Level in HDL: [5Hours] 37. Algorithmic State Machines (ASMs): [5Hours] 38. Design Example (ASMD Chart): [5Hours] 39. Sequential Binary Multiplier: [5Hours] 40. Control Logic: [5Hours] 41. Design with Multiplexers: [5Hours] 42. Review and Assessment: [5Hours]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The primary approach for implementing this module will involve promoting active student engagement in exercises, as well as enhancing their ability to think critically. This goal will be accomplished through a combination of classroom sessions, interactive tutorials, and the incorporation of intriguing sampling-based experiments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3

Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Random-Access Memory
Week 2	Memory Decoding
Week 3	Error Detection and Correction
Week 4	Read-Only Memory
Week 5	Programmable Logic Array
Week 6	Programmable Array Logic

Week 7	Sequential Programmable Devices
Week 8	Mid-course Exam
Week 9	Register Transfer Level Notation
Week 10	Register Transfer Level in HDL
Week 11	Algorithmic State Machines (ASMs)
Week 12	Design Example (ASMD Chart)
Week 13	Sequential Binary Multiplier
Week 14	Control Logic
Week 15	Design with Multiplexers
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Memory Description in Verilog HDL
Week 2	Lab 2: Hamming code (single error correction)
Week 3	Lab 3: Hamming code (double error correction)
Week 4	Lab 4: HDL description of binary multiplier
Week 5	Lab 5: Behavioral (RTL) description of a parallel multiplier
Week 6	Lab 6: Complex programmable logic device (CPLD)
Week 7	Lab 7: Field-programmable gate array (FPGA)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Digital Design: with an introduction to Verilog HDL by M. Morris Mano and Mechael D. Ciletti, 5th Edition, Pearson Education, 2013.	Yes
Recommended Texts	Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Prentice Hall, 2015.	Yes
Websites	https://onlinecourses.nptel.ac.in/noc21_ee39/preview	

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.